ADVICE ON THE USES

AND

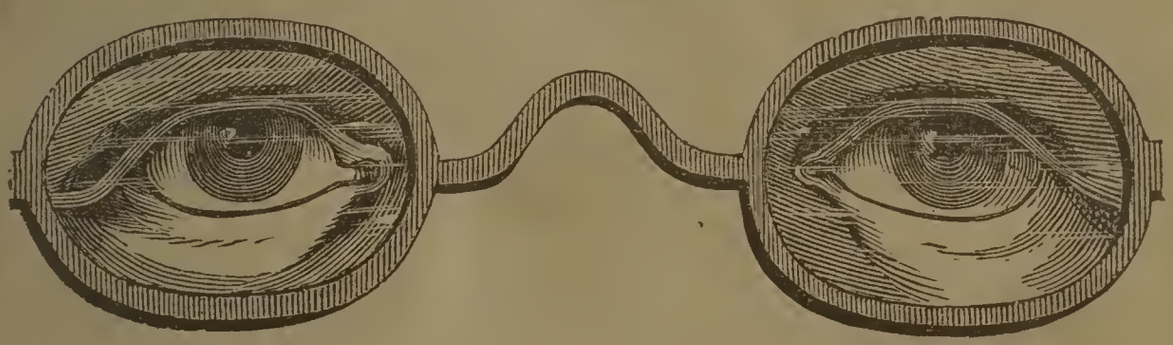
ABUSES OF SPECTACLES

AND

WEAK SIGHT.

BY

DR JOHN PHILLIPS.



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EXAMINATION WITH THE OPHTHALMOSCOPE.—O.S.

The instruments necessary for the examination are: an ophthalmoscope and a spherical lens.

The ophthalmoscope consists of a slightly concave, circular mirror, of a focal length of from 12 to 15 inches. The mirror should have a diameter of about 2 inches, and be mounted in a light frame of tortoise-shell, horn, or gun-percha, with a broad rim, to admit of its being held securely. A circular portion (diameter about one-sixth of an inch) of silvering is removed from the centre of the mirror. Thus a sight-hole is obtained. To this corresponds an opening of equal size in the frame.

The spherical convex lens should have a focal distance of from 2 to 3 inches. It should be mounted in the same material as the ophthalmoscope, with a broad rim, so that when laid flat upon a table, it rests upon the rim, and does not become scratched.

(For more instruction of the ophthalmoscope, I recommend you to my book on "Ophthalmic Surgery."

Ophthalmoscopes and Artificial Eyes for sale by Dr. John Phillips, 195 Clark Street.)

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PREFACE.

THE following essay is so short that there is no occasion for a long preface to introduce it to the reader's notice. One of the principal ends of it is do away a general prejudice in favor of spectacles, namely, that they act as preservers; a prejudice which has caused numbers to use glasses, before they could be of any essential service; who thereby force their eyes into an unnatural state, and bring on a very unpleasant habit. To remedy this evil the marks are distinctly pointed out which determine when the use of glasses will be serviceable to the eye. By an attention to the rules here laid down, they will be taught neither to anticipate evil, by a premature use of spectacles, nor, by too long a delay, to strain and injure their sight.

A second end was, to diffuse more generally a knowledge of the subject among the venders of this article, particularly those who live in the country; and this was the more necessary as numerous instances are continually occurring to every optician of those whose sight has been injured by an improper choice of spectacles.

The nature of the essay has given me an opportunity of pointing out rules for the preservation of the sight, and avoiding what may be hurtful to it. Among the latter, the two principal articles are, the use of reading-glasses and opaque shades to candles; both of which, I have reason to think, are extremely prejudicial to the eyes.

INTRODUCTION.

EVERY one who examines or attempts to treat of the interesting subject of vision, finds himself compelled to exclaim in terms of highest admiration of the superior beauty and contrivance of its inimitable organs, the eyes. Whether we take into consideration the brilliancy of structure so remarkable in that organ, the complication and rapidity of its movements, or its exquisite sensibility, we are equally astonished and delighted.

We have said that it is the most beautiful of all organs of the senses; it is, likewise, the most important and, therefore, the most valued. All the other organs are necessary to the well-being of the individual, but there is none so essential as that of vision. It is, evidently, the great inlet to the higher road of knowledge. It is capable of imparting to the mind information relative to objects so vast that the other senses cannot grasp them, and of bodies so minute as to elude the most delicate and refined tact. It recognizes objects, whether placed in the immeasurable wilds of space, or at a distance of a hair's breadth.

Possessing such power, we perceive that it is with justice that the eye has been termed the "window of the soul." Its importance is further apparent, when we consider what a lengthened, tedious, and unintelligible account we receive in words, which, if directed to the eye, either actually or by representation, would be comprehended in all its bearings. Thus,

we shall often obtain more information concerning objects at a single glance, occupying but an instant of time, than by a whole hour's description addressed to the mind through the ear. To many mysterious things must a blind man give credit, if he will believe the relation of those who can see.

It requires no argument to prove that the loss of so important a function as that of vision is one of the greatest misfortunes that can befall us. It would appear still more incredible to such beings as we have supposed, if they were informed of the discoveries that may be made by this little organ, in things far beyond the reach of any other sense. That, by means of it, we can find our way on the pathless ocean, traverse the earth, determine its size and figure, measure planetary orbs, and make discoveries in the fixed stars. Would it not appear still more strange to these beings, if they should be further informed that, by means of this organ, we can perceive the temper, dispositions, affections, and passions of our fellow-creatures, even when they most desire to conceal them; that, by this organ, we can often perceive what is straight and crooked in the mind, as well as the body; that it participates in every mental emotion, the softest as well as the most violent; that it exhibits these emotions with force, and infuses into the soul of the spectator the fire and agitation of that mind in which they originate.

It is not, therefore, without reason that the faculty of seeing is looked upon as a more noble one than the other senses, as having something in it superior to sensation, as the language of intelligence, the evidence of reason, so-called; not feeling, smelling, tasting; nay, we express the manner of the divine knowledge of seeing, as that kind of knowledge which is most perfect in ourselves.

ADVICE

ON THE USES AND ABUSES OF

SPECTACLES.

IMPERFECT SIGHT.

THERE is no branch of science of which it is more important that a general knowledge should be diffused, than that branch which treats of the various imperfections of sight, and the remedies for them.

To relieve an organ which is the source of the most refined pleasure, is certainly a desirable object. To determine whether spectacles will be advantageous or detrimental, and what kind will best suit their sight; and so instruct those who already use glasses that they may discover whether those they have chosen are adapted to the imperfection of their sight, or are such as will increase their complaint and weaken their eyes, are subjects worthy the consideration of every individual, and constitute the principal business of this work. To this end, we shall, in the first place, explain what we mean by imperfection of sight.

We here understand by imperfection of sight, an absolute or relative debility of it, without any opacity, either in the cornea or other internal part of the eye, and without disease of the retina or optic nerve.

The sight is relatively imperfect when we cannot see an object distinctly in a common light, and at the usual distance

at which it is observed by an eye in the perfect state. In this sense, both the long and the short-sighted are said to have imperfect sight. The short-sighted see distant objects confusedly, those that are near at hand distinctly; their sight is, therefore, defective with respect to distant objects. On the other hand, the long-sighted see distant objects distinctly, and near objects confusedly. An imperfect sight is caused by a confusion in the image formed upon the retina. This happens when all the rays that proceed from any one point of an object are not united again into one, but fall upon different points of the retina; or whenever several pencils of light, from different points of an object, terminate upon one point of the image.

This species of confusion takes place both in long and short-sighted eyes. An imperfect sight differs from an amaurosis or gutta serena; for in the latter, the sight is entirely lost, and the pupil becomes immovable; though, if one eye remains sound, the pupil of the blind eye will move with the pupil of the sound one; but if the sound one be shut, the pupil of the blind eye will be destitute of its motion.

SHORT-SIGHTEDNESS.

Short-sightedness is that state of vision in which a person can see objects perfectly, only when they are at a very short distance from the eyes; nine inches, or less, being the greatest distance at which objects can be plainly seen. It is owing either to too great refractive power of the refractive media of the eye, or to the distance of the retina behind the crystalline being too great; so that in either case, rays of light come to a focus before arriving at the retina, cross, and are in a state of dissipation, when they do impinge on the nervous membrane, and therefore form indistinct and confused images. By bringing the object near the eyes, it is distinctly seen, because the rays from it, which enter the eyes, being now more divergent than when it was at a distance, are not so soon brought to a focus; in other words, the different points of the object, as foci

of incident rays, and the focus to which these rays are brought in the interior of the eye by the refractive media, to conjugate focus, and, accordingly, when the foci of incident rays are brought nearer the refractive media, the foci of refracted rays recede from them.

Too great a refractive power of the media of the eye may be owing either to too great a convexity of their curvatures—the curvatures of the cornea and crystalline—or too great refractive density, or both conjointly.

The situation of the retina at too great a distance behind the crystalline body may be owing either to a preternatural elongation of the eyeball, or to the lens being nearer the cornea than usual.

In short-sightedness, the power of adjusting the eye to different distances is still retained, but within certain limits, thus: the nearest distance may be from two to four inches, the furthest from six to twelve inches.

The peculiarities of short-sighted persons are: 1st. They see small objects more distinctly than other people, because, from their nearness, the objects are viewed under a longer visual angle.

2d. They see them also with a weaker light, because the object being near, a greater quantity of rays from them arrive at the eye. Hence, they can read small print with a weak light.

3d. But they can also see more distinctly, and somewhat farther off, by a strong light than by a weaker one, because the pupil is contracted by the strong light, and all but the more direct rays of light hereby excluded. On the same principle, they see at some distance distinctly through a pin-hole in a card; and when they try to view distant objects, they half close their eyelids. The rays of light in these cases have their divergence at the same time somewhat increased by diffraction.

4th. They sometimes see objects beyond the limit of their distinct vision, double, and sometimes multiplied.

Subjects of Short-sightedness.—This defect of vision seldom occurs in so great a degree before puberty as to be troublesome;

when in a great degree in children, it may be a symptom of a central cataract.

After puberty, when the eyes come to be used in earnest, short-sightedness is usually first discovered to exist, and it may go on gradually increasing, especially if a person use his eyes much in reading, and on minute objects; as the greater frequency of short-sightedness among the educated classes and those whose occupation with minute objects will show.

Myopia sometimes occurs in old persons, whose vision was previously good for ordinary distances.

To persons whose occupation is with minute objects, short-sightedness, unless in a very great degree, is rather an advantage, as they are enabled to observe all the details of their work very accurately; and, in the ordinary exercise of vision, the use of concave glasses is a ready and simple help.

When a tendency to short-sightedness manifests itself in young persons, and especially if the future occupation of the person is to be of a kind requiring good vision for distant objects, much exertion of the eyes on minute work should be avoided, and the eyes exercised on large and distant objects.

Concave glasses help the vision of short-sighted persons for distant objects, simply by increasing the divergence of the rays of light before they enter the eye, so that they may be less speedily brought to a focus than they would otherwise have been, in consequence of the increased refractive power of the media of the eye; or, supposing the refractive power of the media of the eye not increased, but the distance of the retina behind the lens increased, that they may be brought to a focus at a greater distance behind the lens than it would otherwise have been, in order to correspond with the greater distance of the retina behind the lens. Concave glasses are made of different degrees of concavity; the shallower being those adapted for the slighter degrees of short-sightedness, the more concave for the greater degrees.

When very short-sighted, a person requires the use of concave glasses, not only to be enabled to see distant objects, but also for reading with, in order to avoid the necessity for stop-

ping. Less short-sighted people use glasses only to see distant objects.

The focal length of the concave glass which a person will require to see objects at more than two or three hundred yards distance, should be equal to the distance at which he can see to read distinctly an ordinary type with the naked eye six inches, for example.

The focal length of a concave glass which a very short-sighted person will require to read at a convenient distance is determined thus: suppose he can see to read with the naked eye at the distance of six inches, and desires to be able to read at the distance of twelve, the one distance is to be multiplied by the other, and the product, seventy-two, divided by the difference between the two distances, *viz.*, six. The quotient, twelve, is the number of inches the focal length of the glass required should be.

The following are the circumstances which should guide him to his choice:—

The glasses should be the lowest power which will enable him to distinguish objects as he wishes, quite readily and clearly, and at the same time comfortably. If they should make objects appear small and very bright, and if in using them the person should feel his eyes strained or fatigued, or if he becomes dizzy, and if, after putting them aside, the vision is obscure, they are not fit for his purpose, as they are too concave. Having once fitted himself, a person should not too hastily change his glasses, although they may appear not to enable him to see quite so clearly as when he first used them. A glass to each eye should always be used; vision is by this means clearer, and its exercise less fatiguing to the eyes, than when a glass to one eye only is used. The use of a glass to one eye only is, in fact, very detrimental, especially to the opposite eye.

Appearance presented by the Eyes of Myopic Persons.—In many cases, there is nothing peculiar to be observed; but frequently the eyes are prominent and firm, the cornea very convex, the anterior chamber deep, the pupil dilated, the crystal-

line lens more convex, and the "pigmentum nigrum" more diluted and of a higher color.

TREATMENT.

There is a peculiar condition of sight liable to be mistaken for myopia, but which I am inclined, with Dr. Walker, to refer to a congenital weakness of the retina. Such persons cannot see distant objects as well as other people; but they can distinguish tolerably large distant objects better than small ones, and the effort required to make out small type is frequently productive of fatigue in the eyes. As they habitually approach objects nearer the eyes than natural, they pass for near-sighted people. But these are the points of difference: a true myope, having found his points of distinct vision, can read or write for any length of time, without fatigue, and can see clearly, even in a feeble light. This vision of distant objects, too, is materially assisted by the use of concave glasses.

The amblyope (as the other may be called, from the dulness of his sight,) always requires a strong light, and that only for a short time. Concave glasses, instead of assisting, rather confuse his vision, and diminish objects. Convex glasses of a low power, on the other hand, rather assist him.

In such cases, slightly magnifying glasses may, by increasing the dimensions of small objects, diminish the fatigue of the eyes; but they should not be granted without due caution. I have known instances of children having been punished for supposed stupidity, they not learning to read as quickly as others, but slowly and with many mistakes, blundering over their spelling. This really depends, in some cases, on imperfect sight, and the child, with every desire to do his best, is unable to distinguish the letters quickly. In these cases, encouragement, rather than punishment, is needed; the child should have large type, plenty of light, and not be kept at his lessons too long at one time; his general health should be strengthened, and the eyes and head freely bathed in cold water two or three times a day, and twenty drops of muriated tincture of iron twice a day. The question often arises as to whether young boys should be sent to public schools. I am

quite of the opinion that those laboring under defective vision should not. For, being physically unable to compete with other boys, they are placed in a false position; whilst it is quite impossible that they can receive from the masters that patience and attention necessary for their advancement. Thus, they are kept back in every respect, are laughed at by schoolfellows, and the unfair character of dunces allotted to them.

That a power of adjusting the focus of the eye to different distances exists in the healthy eye, is proved as follows:—

Let a person place a couple of thin objects fifteen or twenty yards asunder, in a line with one eye (the other being shut), and let the nearest object be a yard from the eye; on fixing the eye on the nearest object, he will perceive the distant one to be indistinct, and on looking at the distant object, the near one will become indistinct; and on each change of the object of the vision, he will become conscious of an alteration in the adjustment of the anterior of the eye.

If, then, a person employs himself for long periods together, and that for successive days, in reading, microscopical observations, or other pursuits requiring close application, he becomes, not strictly near-sighted in the general acceptation of the term, for he does not hold objects much nearer the eyes than usual, but he finds that he discerns distant objects less and less distinctly. In fact, he finds that the eyes being exercised so much in adjusting the focus for near objects, lose the power of adjustment to the focus for distant objects.

The prevalence of concave spectacles among the Americans, who are great readers, is proverbial; and many must have noticed the same prevalence at our universities. Mr. Ware found, out of 127 students in one college in Oxford, 32 who used either a hand-glass or spectacles. Indeed, I believe that few persons of studious and sedentary habits entirely escape the consequence of their labors. The public are little aware of the extent to which the studious, and those who live by the exercise of their intellect, suffer from imperfection of sight.

Many instances have fallen under my notice of poor students and writers whose poverty compelled them to pursue their lit-

crary avocations in the gloom of dusky apartments, or by the aid of a dim candle, and who have become myopic and amblyopic in consequence. And scarcely less numerous, are those who, though pursuing their labors under more favorable circumstances, are equally visited with this affliction. It would appear that even the study of ophthalmic science may cause the same penalties to be paid; for M. Desmarres informs us, that one of his pupils became very myopic by exerting his eye too much in the diagnosis of diseases of the eye; a sad result of most rare industry!

The progress of this infliction is generally by insensible degrees, and it often happens that the person in whom it is commencing is warned of it more by his own feeling than by the remarks of others, who notice that, when studying or regarding objects, he holds his face nearer than it was his wont. After a time, however, he is sensible that he cannot distinguish distant objects as quickly as formerly; that the eye does not seize them at once, and when seen they are indistinct; and when the affection has made still more progress, they cannot be seen at all. If, in the very earliest stage, a low convex glass be held to the eye, vision is rather assisted; but when the abnormal condition is established, convex glasses cease to render aid, and concaves are required.

If this infliction is induced in an adult, whose eyes have been previously strong, it may be overcome without much difficulty, if taken in time; but when the subjects of it are feeble, strumous youths, in whom the intellectual powers are more vigorous than the bodily, and who have, perhaps, suffered in infancy from constitutional weakness of the eyes, the case is much more unmanageable, and the prospects of cure much less favorable.

The popular idea that the eyes of near-sighted persons are rendered fitter for seeing as they advance in years, is not borne out by experience. The subject has been investigated by Dr. Walker, whose astute mind is well qualified for such enquiries, says: "It has been very generally, if not universally, asserted by systematic writers on vision, that the short-sighted are rendered by age fitter for seeing distant objects than they were in

their youth; but this opinion appears to me unfounded in fact, and to rest altogether upon a false analogy. If those who possess ordinary vision when young, become, from flatness of the cornea, or other changes in the mere structure of the eye, long-sighted as they approach old age, it follows that the short-sighted must, from similar changes, become better fitted to see distant objects.

It is generally supposed that the short-sighted become less so as they advance in years, and the natural shrinking and decay in the humors of the eye lessen its convexity, and thus adapt it better for viewing distant objects; but among the great number of short-sighted people that I have accommodated with glasses, I have never found the reverse of this theory to be true, and the eyes of myopes never required glasses less concave, but, generally, more concave, as they grow older, to enable them to see at the same distance.

I have lost on opportunity of enquiring of myopic persons whether their sight had improved, and I cannot call to mind a single instance in which the reply was decidedly in the affirmative. One case, especially, occurs to me: A lady, 82 years of age, who is a patient of Dr. Walker's, told me that, as long as she could remember, she had used No. 8 myopic glasses, and that, with them, she could read the smallest type and thread a needle with the greatest facility; but, most decidedly, her sight had not changed, as to focus, within her recollection. I examined her eyes and glasses very carefully, and satisfied myself of the power of the latter.

One of the most frequent questions of patrons at my office is, "Do you think, sir, that spectacles will be of use to me?" It matters little whether the sight be impaired by overwork, by congestion, by debility, or by opacities of the cornea; the same idea is current in the minds of the poor. They often try them, and if they do not find assistance from ordinary spectacles, they take to colored glasses, green or blue, as an improvement on the former. I need scarcely say, unless really called for, spectacles do more harm than good; and, for reasons hereafter to be given, such colored glasses are *inadmissible;* not only are

they injurious and exciting complimentary colors, but they are apt to render an eye over-susceptible to light, and if there be retinal congestion, it cannot fail to be aggravated by the additional effort to see objects but dimly illuminated; therefore, in cases where the sight is impaired, but where no intolerance of light exists, the habitual use of colored glasses is highly objectionable.

I have noticed that young persons, about the age of puberty, after severely trying their eyes upon minute objects, as in painting, embroidering, and the like, suddenly become short-sighted. They and their friends are alarmed at their being no longer able to see objects on the opposite side of the street, which a few days before they were able to distinguish with ease. The effort necessary for seeing small objects is attended with pain, and, instead of fifteen or twenty inches, at which the patient used to read, the book must be brought as near to the eyes as six or eight inches. Sudden myopia is most apt to occur in boys sent to learn such trades as watchmaking or engraving, or in young ladies at school occupied with music, painting, embroidering, and other pursuits requiring continued and keen employment of sight. In these cases, the intense application has temporarily paralyzed, as it were, the adjustment to distant objects, and the proper course to pursue is, to give the eyes rest for a few days, when they will recover their natural condition. Frequent bathing of the eyes with cold water will relieve any congestion of the vessels. I have also found great relief by applying concentrated tincture of capsicum, by rubbing it for a few minutes, daily, over the forehead and temples with a sponge; but care should be taken not to allow it to enter the eye.

The circumstance of eyes differing in their focal length is a common occurrence, and needs but a few words on the proper course to be pursued. There is a very general impression that one eye is stronger than the other, the right being supposed to be the strongest, partly, perhaps, from its being preferred for looking at objects when one eye only is required, as in taking aim in shooting, using a microscope or telescope, etc. Conven-

ience has much to do with this, the right arm and the right eye corresponding in action; when, however, there is really a difference in the vision of the eyes, it may be found how far this depends on the focal length, by placing an open book at the ordinary reading distance.

We also occasionally find that one eye will be myopic and the other presbyopic, a condition of vision embarrassing both to the patient and to the surgeon, but the nature of which may easily be ascertained by a careful trial with glasses, and looking at the page with the eyes alternately, the one not used being closed. Supposing, then, that the type appears distinct to the right eye but confused to the left, the book should be slowly drawn nearer, and if the focus of the left eye is shorter than that of its fellow, the type will become distinct at a certain distance; one or more inches less than the ordinary distance. To make the point more certain, the vision of the left eye can be made equal with the other, by holding before it a slightly concave glass if the difference be trifling, or a higher power if the inequality be great.

It is important to all persons, but especially to the young, and to those whose position in life requires much exercise of the eyes, that they should have the benefit of both, and that all the labor should not be thrown on one, as necessarily happens in the condition of vision under consideration, a condition sometimes produced by the carelessness of inferior opticians or the hawkers of cheap spectacles, who sell lenses of different focal lengths in frames intended for persons whose eyes are equal; or who supply those eyes in which there is an inequality in the foci with duplicate glasses, rendering, in each case, one eye useless.

In early life, the vision of the eyes may often be brought into harmony by blindfolding the perfect eye and patiently practising the other at the utmost distance, increasing that distance by small but steady degrees, avoiding rapid or vacillating changes. If this does not suffice, practise, with lenses hereafter to be described, will be proper; but if circumstances prevent the exercise being satisfactorily carried out, it will be necessary

to have a spectacle frame made with a lens for the imperfect eye, just sufficiently strong to equalize the vision. The circle before the perfect eye should be blank, but in order to counteract the weight of the lens (which would throw the frame out of its proper position), the empty side of the frame should be made heavier than the other.

Near-sighted persons are very apt to stoop while engaged in study. To avoid a practice so injurious to the figure and health, they should use a high desk when reading or writing; and if glasses are indispensable, such only should be used as just suffice to enable the parties to pursue their occupations at the ordinary reading distance, that of fourteen inches. Small type, sketchings, microscopical pursuits, and objects requiring close inspection, should be avoided; the individual should overcome his natural tendency to a cramped hand, and write boldly and freely; and be the pursuit what it may, in which he is engaged, the greatest possible distance should be maintained between his eyes and the object.

In all cases of myopia, and especially in early life, or when the affection is just commencing, it is highly important that any tendency to an over supply to the eyes should be counteracted by a proper amount of bodily exercise, and every opportunity should be embraced for exercising the eyes on distant objects. Near-sight is comparatively rare in persons engaged in agricultural pursuits, and is almost, if not quite, unknown among those uncivilized nations whose eyes are constantly practised in nomadic warfare or the chase.

Near-sight may be acquired in early youth, by the habit common to infants, of approaching their eyes very close to any object on which their attention may happen to be engaged. Observe a group of children learning to write or draw, almost all with their faces sideways and their tongues in one corner of their mouths, nearly touching with their cheeks the paper or slate on which they are laboriously accomplishing their task. Many infants have been rendered short-sighted, and many have acquired squints, from constantly playing with toys; for, as the visual axis converges when objects are held near the eyes, fre-

quent repetition of this may end in strabismus. And I may here remark, that strict attention should be paid to the position of an infant's sleeping cot, and to the attitude in which it is placed in its nurse's arms. The eyes of the infant ever seek the light, and many an unsightly cast has been entailed on a child by its being always placed with one and the same side to a candle or a window. The light in the nursery should not be too much on one side of the cradle, nor should a candle or lamp, in the evening, be so placed that the eyes of the child are distorted when looking at it. There is sound judgment in printing children's books in good, bold type, in encouraging them to observe distant objects, and in inviting them to describe what they see in landscapes.

Near-sighted children are often fond of books, and love to pore over some favorite story, in a quiet corner, for hours together. They should be watched, and compelled to hold their heads ten or twelve inches from the page, and the same in the schoolroom. Such children are obliged, during music lessons, to lean forward in a very unseemly manner, to distinguish the notes. To obviate this, a sliding bookstand should be attached to the piano, and should be drawn forward when the child is practising. As, however, some musical instruments will not admit of such an arrangement, spectacles of a low power may be used at that time, and at that time only; and the lesson should not exceed half an hour, without a pause of a few minutes for the eyes to rest.

Insufficiency of light in rooms where children receive instruction, or where they are taught mechanical work is a cause of near-sight, and, occasionally, even more serious mischief. Care should, therefore, be taken that the school and working rooms should be properly and sufficiently lighted.

FAR-SIGHTEDNESS.

To detail those circumstances which are, in general, marks of advancing age, and always of pattial infirmity, must be ever unpleasant, and would be equally unnecessary, if it were not for

the means of lessening the inconvenience attendant on those stages of life. By long-sightedness, remote objects are seen distinctly, near ones confusedly, and, in proportion, as this increases, the nearer the objects, the more indistinct they become, till at length it is found almost impossible to read common-sized print without assistance. An imperfect image is formed upon the retina, because the rays of light which come from the several points of an object, at an ordinary distance, are not sufficiently refracted, and, therefore, do not meet on the retina, but beyond it. Various are the causes which may occasion this defect: If the convexity of the cornea be lessened, or if either side of the crystalline becomes flatter, this effect will be produced; if the retina be not sufficiently removed from the cornea or crystalline, or if the retina be too near the cornea or crystalline, it will give rise to the same defect, as will also a less refractive power in the pellucid parts of the eye. In like manner, too great proximity of the objects will prevent the rays from uniting till they are beyond the retina. But if all these causes occur together, the effect is greater. This defect is however, in general, attributed to a shrinking of the humors of the eye, which causes the cornea and crystalline lens to lose their original convexity, and become flatter. The same cause will bring the retina too near the cornea.

Another change which the eye undergoes in age is the impairment of its power of adjustment.

As we advance in life, not only does the refractive power of the eye diminish, but we lose the power of accommodating the organ to near objects.

The eye, in its state of perfect indolent vision, is adapted only to distant objects, and it cannot see near objects distinctly but by an effort. This effort, long persevered in, becomes painful, whereas, the regarding of distant objects can be continued without any feeling of fatigue. The power to make the peculiar effort in question, is partially or totally lost by the presbyopic eye; a fact analogous to the diminished activity which takes place in all the functions of the body as life advances.

The symptoms of presbyopia, then, are: Difficulty in dis-

cerning close objects; so that a person who, in early life, could read ordinary print, with ease, at twelve or fourteen inches, is now obliged to hold a book two feet, or even further, from his eyes; and the act of threading a needle, or nibbing a pen, becomes fatiguing to the eyes, if not almost impossible, excepting when assisted by an increase of light. Employing them at fine work for any considerable length of time, induces headache and uneasiness about the brows and forehead. These symptoms may be accounted for thus: In consequence of the object being removed to a greater distance, the visual angle, the quantity of light, and the picture on the retina become smaller; so small, indeed, as to render it difficult for the retina, with its impaired sensibility, duly to appreciate it without effort and a considerable increase of light. The diminished size of the pupils, which attends declining years, increases the necessity for more light.

With this state of vision the person can see objects distinctly only when they are at a very considerable distance from the eyes; in reading, for example, he holds the book at arm's length.

Far-sightedness being in almost all respects the converse of short-sightedness, the best way of discussing it here will be to reverse the account given of short-sightedness, and which will therefore stand thus:—

Far-sightedness is owing either to diminished refractive power of the refractive media of the eyes, or to the distance of the retina behind the crystalline body being too short; so that in either case the rays of light tend to come to a focus at a point behind the retina, on which, therefore, they impinge in circles of dissipation, and form indistinct and confused images.

By removing the object from the eyes, it comes to be distinctly seen, because the rays from it which enter the eye, being now less divergent than when it was near, are more quickly brought to a focus; in other words, the different points of the object as foci of incident rays, and the foci to which these rays are brought in the interior of the eye by the refractive media, are *conjugate foci;* and accordingly, when the foci of incident

rays are removed from the refractive media, the foci of refracted rays come nearer them.

Diminished refractive power of the media of the eye may be owing to diminution of the convexity of their curvatures, flattening of the cornea and crystalline. As to refractive density, there is probably an increase rather than a diminution of it, but this appears to be more than overbalanced by the diminution of curvature.

The situation of the retina too near the crystalline may be owing either to a preternatural shortening of the axis of the eyeball, or a receding of the lens from the cornea.

In far-sightedness, the power of adjusting the eye to different distances is much weakened. In this respect, far-sightedness differs from short-sightedness, in which the power of adjustment is still retained. In far-sightedness, it may be said that the habitual adjustment of the eye is for distant objects, and that in trying to read, for example, the power of adjustment is exerted to the utmost; hence the fatigue and confusion of vision which soon ensue.

Appearances presented by the Eyes of Far-sighted People.—In many cases, there is nothing peculiar to be observed; but frequently the eyes are sunk, the cornea flat, and of small diameter, and the pupil contracted.

Peculiarities of Vision of Far-sighted People.—1. They see small objects indistinctly at every distance, because when near they are out of focus, and when removed from the eye somewhat they are seen at a small visual angle and with little light. By increasing the light, they see better. Hence, they do not see so well by candle-light as before, and when attempting to read by candle-light, they place, perhaps, the candle between them and the book held at arm's length. 2. They see large and distant objects very distinctly. 3. In most presbyopic persons, Dr. N. Arnott has ascertained that double vision in the eyes strongly exists in a slight degree.

Subjects of Far-sightedness.—Far-sightedness seldom occurs except in persons who have passed middle age, and in them it is so common, that it is to be viewed as a natural change in the

state of the eye. As it occurs in young persons, it will be spoken of under the head of *Asthenopy*.

Prevention and Treatment.—Though instances have occurred of persons who have been long presbyopic, recovering their former vision, and thereby being enabled to lay aside the use of their spectacles, recovery from presbyopy is not to be calculated on; but this is of small moment, as vision can be perfectly assisted by means of spectacles. Something, however, may be done in the way of preserving the sight by avoiding overexertion of the eyes in reading and other minute work, especially by artificial light, at the time of life when far-sightedness, with diminution of adjusting power, usually comes on.

Convex glasses help the vision of far-sighted people for near objects, by diminishing the divergence of the rays of light before they enter the eye, so that they may be more speedily brought to foci than they would otherwise have been, in consequence of the diminished refractive power of the eye; or, supposing the refractive power of the eye not diminished, but the distance of the retina behind the lens diminished, that they may be brought to foci at a less distance behind the lens, than they would otherwise have been, in order to correspond with the diminished distance of the retina behind the lens.

Convex glasses are made of different degrees of convexity: the least convex being those adapted for the slighter degrees of far-sightedness, the more convex for the greater degrees.

To see distant objects, far-sighted persons do not, in general, require convex glasses. It is most commonly to enable them to read and do minute work that far-sighted people use spectacles.

If it is only at a *very great* distance that a person can see distinctly, the focal length of the convex glasses which he will require to enable him to read will be equal to the distance at which he wishes to see to read.

If he is not so very far-sighted, but can see small objects distinctly, at twenty inches distance, for example, the focal length of the convex glasses which he will require to enable him to read at twelve inches distance, is determined by multiplying the

two distances together, and dividing the product, 240, by the difference between them, *viz.:* 8. The quotient, 30, is the focal length in inches of the glasses required.

The following are the circumstances which should guide him in his choice:—The glasses should be of the lowest power which will enable him to see objects distinctly as he wishes, and at the same time comfortably. Glasses which make the objects appear larger than natural, and strain and fatigue the eyes and cause headache, are not adapted to his case—they are too convex. It is usually found that glasses the next degree more convex are required for work by artificial light.

The alteration in the eye on which the far-sightedness depends, generally goes on to increase with age; hence it is necessary, after a time, a few years, to change the glasses first chosen for others more convex. In regard to this exchange it is to be observed, that it ought not to be too hastily had recourse to, nor, on the other hand, too long delayed. The same feeling of necessity which first prompted to the use of glasses, will indicate the necessity of change.

It is a not uncommon notion that glasses of certain focal lengths are adapted to certain ages, but this is erroneous. Still, though the choice of glasses cannot be determined by the mere age of the person, there is a certain average relation between the age and the focal length of the convex glass required, which is expressed in the following table:—

Age in years,	40,	45,	50,	55,	60,	65,	70,	75,	80,	85,	90,	100.
Focal length in inches,	36,	30,	24,	20,	16,	14,	12,	10,	9,	8,	7,	6.

Reading Glass.—This it a double convex lens, broad enough to permit both eyes to see through it. It is used for the purpose of magnifying the object; whereas, convex spectacles are used merely to render objects distinct at a given distance, without magnifying them as above mentioned.

The color and consistence of crystalline humor alters with age: it is thicker, cloudy, and less transparent as we advance in years; which is one reason, among others, why many elderly people do not reap all the benefits from spectacles which we might naturally expect.

There is, usually, little in the appearance of the eyes to account for the changes. This, indeed, may be expected; for although the cornea, in the majority of cases, is, perhaps, somewhat diminished in convexity, yet it is not perceptible. The inefficiency of the eyes probably depends less on the altered form of the cornea, than upon that of any other media of the organ, especially of the crystalline lens. The eyes of an old person are commonly sunken in their sockets; but this is dependent upon the general absorption of the adipose tissue of the orbits, as well as of the body generally, which is one of the phenomena of age. It is the diminution of the aqueous contents of the globe, in combination with peculiar changes in the lens, which becomes denser and less convex, of diminished transparency, and more or less of an amber hue, which influences the refractive powers. As age creeps on, the "pigmentum nigrum" (to which the blackness of the pupil is due) diminishes in quantity, giving to the pupil a greenish or grayish hue, which, to an inexperienced eye, might be mistaken for incipient cataract or glaucoma. The cornea becomes less transparent, a white circle, called "arcus senilis," forms around its margin, the colors of the "iris" fade, and the nervous power of the eye becomes less energetic.

The period of life when presbyopia displays itself, is the same as that at which hard cataract commences; and I have seen many cases where the imperfections of vision caused by the decay of the lens has been confounded with presbyopia.

These facts make it clear that a protuberant eye is not so well constituted for vision as one that is sunk in the head; neither extreme is, indeed, desirable, yet, undoubtedly, of the two, that which is deep set is preferable, as affording the clearest sight and being least liable to injuries from external accidents and of light.

TREATMENT.

The sun of our animal existence has been wisely ordained to travel at so slow a rate that its progress is almost imperceptible, and so ardently do we love to bask in its rays, that when Time whispers to us that he has passed the meridian, we vainly en-

deavor to persuade ourselves that he may have mistaken the point of his culmination.

I have already said that the failure of the sight is one of the earliest symptoms of declining years, but there is a strong disinclination to admit this failure; at any rate, we are not willing to proclaim it by adopting glasses. Their use, however, should not be deferred; for, although it is a common notion that spectacles are injurious to the eyes (and no doubt they are so, if those of an improper description be employed), yet, when the powers of the eye begin to fail, so that we can neither read nor write for any length of time without great discomfort, it is reasonable to conclude that refraining from their use is more injurious than their adoption.

2d. We, therefore, who prize the most valuable gift of nature, should be less anxious as to what others may think of our age, than for the preservation of so valuable a possession.

3d. The term "preservers," applied, as it is, to the lowest description of convex glasses, alone tends to convey the idea that if such glasses are used in time, they prevent any further changes in the eye. This is erroneous; and it is to be regretted, that the lowest magnifying power should have received that appellation, for all glasses are preservers, if well adapted to the eye; whereas, by applying that term to those particular glasses alone, thousands are induced to use them before they really require them, which is productive of injurious consequences, inasmuch as, by assisting the eye before it requires help, it encourages it to be indolent in its action. As a general rule, spectacles always act beneficially when they afford just so much assistance to the eye in its attempt at adjustment as enables it without fatigue to form a distinct picture upon the retina, rather than beyond it.

Some refrain from the use of glasses who really require their aid, from the belief that if they once begin to use them they will never be able to leave them off. In the great majority of cases, this is perfectly true; but, even then, it is better to submit with a good grace to an affliction which can seldom be averted, and to have recourse to those simple means which at

once set the eye at ease and enable its possessor to enjoy many hours of comfort and rational employment, which would otherwise be lost.

Daily experience teaches us that the decay of vision is hastened by many causes, which are frequently overlooked. Although it is about the age of 40 that the sight begins to fail, yet we find some persons who attain extreme old age without needing glasses at all. Other persons, on the contrary, require glasses at the age of 30; and though much depends on constitution, much also depends upon the person's habits.

One of the worst habits, is that of overworking the eyes by candlelight. Repose from labor, so necessary for the restoration of tone and vigor to the several organs of the body, is too sparingly granted to the eyes. Some, from a desire to distinguish themselves; others, urged by necessity, encroach upon the hours of rest, and overtax the sight without mercy by lamp or gas work. To the poor, but working classes, medical treatment, when the eyes are thus oppressed, affords only temporary relief; the return to similar habits, however necessary, invariably brings back the same disease, and, by its repeated attacks, vision is sooner or later destroyed. Let us hope that the advancing spirit of the age will arrest so crying an evil.

The following remarks are addressed to the former class; to those who from motives of ambition, or from love of study, neglect those ordinary precautions, without which the eyes will inevitably suffer:—

Let it be remembered that day-work is preferable to night-work; that while the light of a candle or lamp is trying even to the strong eye, the moderate light of the sun is strengthening to it. Those whom circumstances compel to study in the evening, should select that kind of work which is least distressing to the eyes. They should especially avoid indistinct writing or small print; the diamond edition, in which the print is extremely small and very injurious to the eyes.

Persons who write much, especially in the evening, should use blue wove paper in preference to that of the yellowish-white description, to which the term "cream laid" is applied. There

is a paper of a deeper blue than ordinary, which is very agreeable to irritable eyes, for writing by artificial light.

Jet-black ink is far better than blue or fancy shades of purple, brown, etc. Pale ink is altogether bad, and the fair sex, especially, would do well to bear in mind that they would show the most kindly consideration for their correspondents and benefit their own sight, by using good black ink, and, I may add, writing legibly.

Red rulled lines, when in any number on a page, are objectionable.

It is wise to change the position occasionally, during hard study; to write, sometimes standing, and other times sitting; and to break the labor, now and then, by walking about. The simple plan of raising the eyes from the sheet or page and fixing them for a few seconds on the cornice at the other side of the room, so that the adjustment of vision may be altered, can not be too strongly recommended.

Persons with feeble sight or irritable eyes should not sleep with their couches facing the window, nor should their writing-tables be in that position. There is another thing to be especially avoided by such parties, namely: reading whilst traveling in a railroad carriage. The peculiar vibration imparts an unsteadiness to the page which is most trying to the eyes, and more than one person, to my knowledge, has suffered from this thirst for knowledge, during daily journeys to and from the town.

Reading by firelight, or simply gazing at the fire when sitting alone, or in a contemplative mood, is highly injurious to feeble eyes, and should be avoided by all. It is not advisable to read by twilight; too little light is as pernicious as too much light. Yet, many persons, evening after evening, try their eyes in this way, rather than burn a candle or lamp.

It is injurious to the eyes to be long exposed to the reflection of a strong light, whether artificial or natural, such as the reflected sunshine from the page of a book; too brilliant a light produces undue excitement of the eyes. Travelers in African deserts find it necessary to protect these organs from the sun's

rays by a piece of crape. The inhabitants of some Eastern countries, for the same purpose, anoint the edges of the lid and the eyelashes with a black pigment, composed of oxide of antimony and oil, which has the effect of subduing the light, and, at the same time, improving the personal appearance.

The inhabitants of the Artic regions ingeniously protect their eyes from the light reflected with the snow, by wearing in front of the eyes a long and thin piece of wood, perforated by two long horizontal slits, one corresponding to each eye. By means of this simple contrivance, just such a quantity of light is permitted to enter the pupil as will suffice for vision.

To preserve weak eyes as much as possible from a strong light, neutral tint spectacles are preferable. Many physicians recommend wire goggles, which absorb the heat and overheat the eye, and I have seen many eyes injured by using them. In reading or writing, just that amount and quantity of light, whether natural or artificial, should be allowed, which, while it thoroughly illuminates the objects, feels grateful and pleasant to the eyes. This desideratum can never be obtained without due regard to the position of the light. The light cast upon a book, whilst the candle or lamp is in front, is by no means pleasant, and the glare of the flame is very trying to weak eyes. It will be found that if the candle or lamp be placed a little above and back of the reader and slightly to one side, the most pleasant and least injurious effect is produced; for the light when reflected to the eyes is least distressing, and, at the same time, the eyes are perfectly protected from the heat and glare of the flame.

The habit, common with far-sighted persons, of drawing the candle to them, and holding the book they are reading close to it, has reference to the need which then exists for strong light. Eyes, when far-sighted, require more light than younger eyes; and judgment is required to secure this without overdoing it and stimulating the organs too much. It would be well, if in public buildings more attention was paid to the position of the lights. It is very distressing to sit in a gallery, immediately in front of a gas-burner or lamp, for an hour or more; the eyes

frequently do not recover from the irritation thus excited for several days. Not only might the evil be easily removed, by employing lights of greater power, properly subdued and placed near the ceiling, but there would be a great advantage gained from the increased purity of the air.

Sudden transition from gloom to strong light should be avoided. The dazzling effect produced when we come suddenly from darkness to light, arises from the pupils having been widely dilated to admit the greatest number of luminous rays whilst in the gloom; as the pupil of the eye requires time to contract, sudden transition from comparative darkness to a bright light compels the eye to admit far more rays than is agreeable, or it is calculated to bear without injury; temporary dazzling and a sensation of pain is excited in consequence. So weak and susceptible do the eyes become, if kept for a long time in darkness, that the ordinary light of day is distressing to them. I have frequently been consulted by patients laboring under this morbid sensibility, sometimes, from having been kept for a long time in a darkened room: at other times, from having injudiciously covered up the eyes with a bandage or shade, in hope of subduing an inflammation. The working classes are fond of binding up their eyes to those of their children, if attacked with any disorder, whether attended with increased sensibility to light or not. It is difficult to convince them of the necessity of taking the bandage off, and, by degrees, to accustom the eyes to the stimulus of the light.

The following are the circumstances which should guide them in their choice of glasses:—The glasses should be of the lowest power which will enable them to see objects as distinctly as they may wish, and, at the same time, comfortably; glasses which make objects appear larger than natural, and strain and fatigue the eyes and cause headache, are not adapted to their case. There are two convex glasses used, the double convex being preferred. The lowest power in ordinary use in England has a focus of 48 inches; but in France, very much lower powers are used. M. Sichel commences with a 72-inch, and in some cases with a 96-inch. Mr. Andrew Ross, however, whose

experience as an optician is well known, has informed me that, in the course of his business, he met with but one person who could perceive any sensible difference between those two powers, as far as assistance to sight was concerned.

It is quite possible that, in the early stage of far-sightedness, a 72-inch glass may be sufficient, and if found to be so, it should be, by all means, preferred to a higher number; but, practically speaking, a 48-inch is that most usually required, because persons in this country seldom seek assistance until the far-sightedness has advanced beyond the aid of a 72-inch glass.

It cannot be too strongly urged upon any one about to use spectacles for the first time, that the power which will enable them to read without much exertion by candlelight, is the only one suitable for them. It is only by candlelight that glasses should be used at first; and as soon as they find that they stand in need of glasses by day, as well as by gaslight, and that the glasses which they use no longer afford them sufficient assistance by gaslight, it will be proper to use the next power for the evening, but for the evening only, and to allow themselves the use of the others only during the day.

The greatest caution as to increasing the power, should be observed, for persons who change their glasses unnecessarily, increasing the power each time, are exhausting the resources of art, instead of economizing them as much as possible. Optical aid can only be extended to a certain point, and the steps to that point should be as slow and as numerous as possible. By exercising prudent precautions, persons may attain great age, and yet never require the aid of glasses beyond a very moderate power; others, on the contrary, who, from ignorance, frequently increase the power of their glasses, may run through the whole assortment, and leave themselves only the most inconvenient resources to fall back upon, *viz.:* the very highest powers.

The eye should not be permitted to dwell on glaring objects, more particularly on first awakening in the morning; the sun, of course, should not be permitted to shine in the room at that time, and only a moderate quantity of light should be admitted.

It is plainly to be seen that, for the same reason, the furniture of the room should be neither altogether of a red nor a white color; indeed, those whose eyes are weak would find considerable advantage in having green for the furniture of their bedchambers. Nature confirms the propriety of the advice given in this rule, for the light of day comes on by slow degrees, and green is the universal color she presents to our eyes.

There is nothing which preserves the sight longer than always using, both in reading and writing, that moderate degree of light which is best suited to the eye; too little strains them, too great a quantity dazzles and confounds them; the eyes are less injured by the want of light than by an excess of it; too little light never does them any harm, unless they are strained by efforts to see objects to which the degree of light is inadequate, but too great a quantity has, by its own power destroyed the sight. Thus, many have brought on themselves a cataract, by frequently looking at the sun or a fire; others have lost their sight by being brought too suddenly from extreme darkness to the blaze of the sun.

ADVICE ON SPECTACLES.

The discovery of optical instruments may be esteemed among the most noble, as well as among the most useful gifts which the Supreme Artist has bestowed on man. For all-admirable as the eye came out of the hands of Him who made it, yet He has permitted this organ to be more assisted by human contrivance; and that not only for the uses and comforts of common life, but for the advancement of natural science, whether by giving form and proportion to the minute bodies that were imperceptible to the unassisted sight, or by contracted space, and as by magic art, bringing to view grander objects of the universe, which were rendered invisible by their immense distance from us.

Noble as these inventions are, the discovery of spectacles may still claim the superiority, as being of more universal benefit and more extensive use. They restore and preserve to us

one of the most noble and valuable of our senses; they enable the mechanic to continue his labor, and earn a subsistence by the work of his hands, till the extreme of old age; by their aid the scholar pursues his studies and recreates his mind with intellectual pleasures, and thus pass away days and years with delight and satisfaction, which might have been devoured by melancholy or wasted in idleness.

As spectacles are designed to remedy the defects of sight, it is natural to wish that the materials of which they are formed should be as perfect as the eye itself; but vain is the wish, for the materials we use, like everything human, are imperfect. Yet, we may deem ourselves happy, to have in glasses a substance so analogous to the humors of the eye, a substance which gives new eyes, eyes to decrepit age, and enlarges the views of philosophy. The two principal defects are small threads or veins in the glass, and minute specks. The threads are most prejudicial to the purpose of vision, because they refract the rays of light irregularly, and thus distort the object and fatigue the eyes; whereas, the specks only lessen the quantity of light, and that in a very small degree. We are now able to decide upon a very important question, and say how far spectacles may be said to preserve the sight. It is plain they can only be recommended as such to those whose eyes are beginning to fail, and it would be as absurd to advise the use of spectacles to those who feel none of the forecoming inconvenience, as it would for a man in health to use crutches to save his legs. But those who feel these inconveniences should immediately take to spectacles, which, by enabling them to see objects nearer, and by facilitating the union of rays of light on the retina, will support and preserve the sight.

From whatever causes this decay arises, an attentive consideration of the following rules will enable any one to judge for himself when his sight may be assisted or preserved by the use of spectacles:—

First. When we are obliged to remove small objects to a considerable distance from the eye, in order to see them distinctly.

Second. If we find it necessary to have more light than formerly, as, for instance, to place the candle between the eyes and the object.

Third. If, on looking at and attentively considering a near object, it becomes confused, and appears to have a kind of mist before it.

Fourth. When the letters of a book run into one another, and hence appear double or treble.

Fifth. If the eyes are so fatigued by a little exercise that we are obliged to shut them from time to time, and relieve them by looking at different objects.

When all of these circumstances concur, or any of them separately take place, it will be necessary to seek assistance from glasses, which will now ease the eyes, and, in some degree, check their tendency to grow flatter; whereas, if they be not assisted in time, the flatness will be considerably increased, and the eyes weakened by the efforts they are compelled to exert.

Blindness, or at least weakness of sight, is often brought on by these unexpected causes. Those who have weak eyes should, therefore, be particularly attentive to such circumstances, since prevention is easy, but the cure may be difficult and sometimes impracticable.

Whatever care, however, be taken, and though every precaution be attended with scrupulous exactness, yet, as we advance in years, the powers of our frame decay, an effect which is, generally, first perceived in the organs of vision.

Age is, however, by no means an absolute criterion, by which we can decide upon the sight, nor will it prove the necessity of wearing spectacles. For, on the other hand, there are many whose sight is possessed, in all its vigor, to an advanced old age; while on the other, it may be impaired in youth by a variety of causes, or be vitiated by internal maladies. Nor is the defect either the same in different persons at the same age, or in the same person at different ages. In some the failure is natural, in others it is acquired.

Though in the choice of spectacles every one must finally determine for himself which are the glasses through which he

obtains the most distinct vision, yet some confidence should be placed in the judgment of the optician of whom they are purchased, and some attention paid to his directions.

By trying many spectacles the eye is fatigued, as the pupil varies in size with every different glass, and the eye endeavors to accommodate itself to every change that is produced; hence, the purchaser often fixes upon a pair of spectacles not the best adapted to his sight, but those which seemed to relieve him most while his eyes were in a forced and unnatural state, and, consequently, when he gets home they are returned to their natural state, and he finds the glasses which he had chosen fatiguing and injurious to the sight. The most general, and perhaps the best, rule that can be given to those who are in want of assistance from glasses, in order to so choose their spectacles that they may suit the state of their eyes, is to prefer those which show objects nearest their natural state, neither enlarged nor diminished, the glasses being nearer the eye, and which give a blackness and distinctness to the letters of a book, neither straining the eye nor causing any unnatural exertion of the pupil. For no spectacles can be said to be properly accommodated to the eyes, which do not procure them ease and rest. If they fatigue the eyes, we may safely conclude, either that we have no occasion for them, or that they are ill-made or not adapted to our sight.

It is a certain and very important fact, that long-sightedness may be acquired, for countrymen, sailors, and those who are habituated to look at remote objects are *generally* long-sighted, want spectacles soonest, and use the deepest magnifiers; on the other hand, the far greater part of the short-sighted are to be found amongst students and those artists who are daily conversant with small and near objects, every man becoming expert in that kind of vision which is most useful to him in his particular profession and manner of life. Thus, the miniature painter and engraver see very near objects better than a sailor, but the sailor sees distant objects better than they do; the eyes, in both cases, endeavoring to preserve that configuration to which they are most accustomed.

In the eyes, as well as other parts of the body, the muscles, by constant exercise, are enabled to move with ease and power, but are enfeebled by misuse. The elastic parts, also, if they are kept too long stretched, lose part of their elasticity; while, on the other hand, if they be not duly exercised, they grow stiff and are not easily stretched.

From the consideration of these facts, we may learn, in a great measure, how to preserve our eyes. By habituating them occasionally to near as well as distant objects, we may maintain them longer in their perfect state and be able to postpone the use of spectacles for many years, but we may also infer from the same premises that there is great danger when the eyes have become long-sighted of deferring too long the use of spectacles, or using those which magnify too much, as we may by either method so flatten the eye as to lose entirely the benefits of naked vision. It may not be improper, in this place, to remark that the long-sighted eye is much more liable to be injured by too great a degree of light, than those which are short-sighted. Though it is in the general course of nature that this defect should augment with age, yet there are not wanting instances of those who have recovered their sight at an advanced period, and have been able to lay aside their glasses and read and write with pleasure without any artificial assistance.

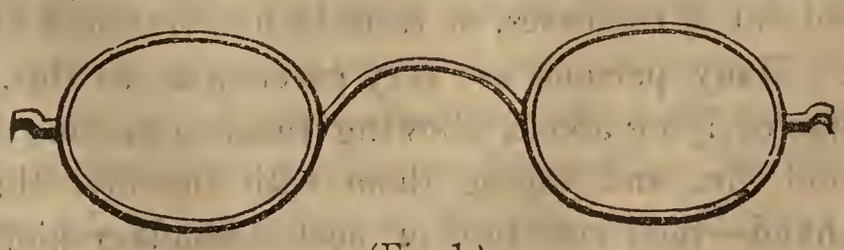
Among many causes which may produce this disease, the most probable is, that it generally arises from a decay of the fat in the bottom of the eye. The pressure in this part ceasing, the eye expands into somewhat of an oval form, and the retina is removed to a due focal length from the crystalline lens.

Increasing years have a tendency to bring on this defect, and earlier among those who have made less use of their eyes in their youth; but whatever care be taken of the sight, the decay of nature cannot be prevented. The humors of the eye will gradually waste and decay, the refractive coats will become flatter, and the other parts of the eye more rigid and less pliable; thus, the latitude of distinct vision will become contracted. It is also highly probable that the retina and optic nerve lose a portion of their sensibility.

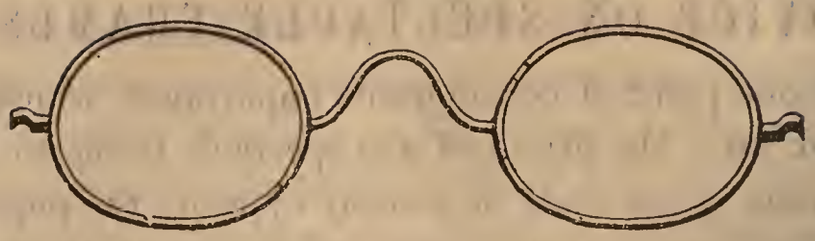
ADVICE ON SPECTACLE FRAMES.

There is one point of considerable importance, which is often disregarded, *viz.:* the fitting of the spectacle frame so that the centre of each glass shall be exactly opposite the pupil of the corresponding eye. A moment's reflection will show how important this is. There are scarcely two persons of precisely the same width between the eyes, and yet, in the majority of cases, this fact is entirely lost sight of in the selection of spectacles. A person finds that when, at an optician's, he looks through a lens of a certain power, it suits him exactly; he sees delightfully with it, and forthwith orders spectacles of that power. He tries them on as soon as he receives them, anticipating with eagerness the comfort they will afford him, instead of which, he finds that he can hardly see at all, or, if he does, his eyes soon feel fatigued. The glasses are right; the error is in the frame. Unless the width between the eyes is such that the centre of each glass is exactly in front of the eye which it is to assist, the rays which pass through the lens will not all enter the pupil, and the spectacles will be comparatively valueless. Care should be taken, then, in every case, to have the bridge made of such a curve and such a width that the position of the lenses, as regards the eyes, should be perfect, both horizontally and vertically.

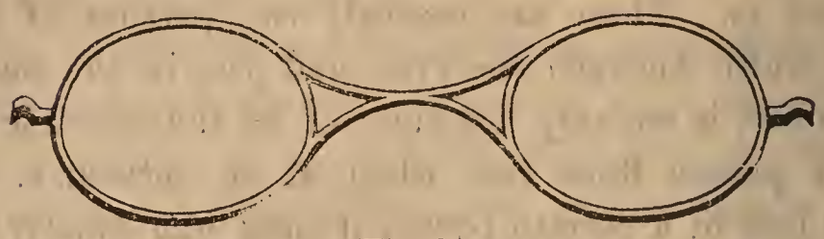
In ordinary myopic spectacles, the average height of the bridge above the axis of the lenses is from one-eighth to three-sixteenths of an inch. Where the arch of the nose is depressed, the bridge is made one-eighth below the centre. The three most remarkable spectacles are represented in the following figures. The first (Fig. 1.), is that commonly used for presbyopic glasses. The second (Fig. 2.), brings the glasses near the eyes. The third (Fig. 3.), is sometimes preferred, as being generally useful:—



(Fig. 1.)



(Fig. 2.)



(Fig. 3.)

I have mentioned the curve, as well as the width, for by it the height of the glass is adjusted. Short-sighted persons require the glasses to be nearer the eyes than do far-sighted, and this is to be regulated by a peculiar curvature of the bridge, a curvature in two planes, rising vertically and projecting out at the same time, as represented in (Fig. 2.)

It may be as well to notice here that whenever the frames are well fixed, the two eyes appear to the individual to be looking through the glasses only.

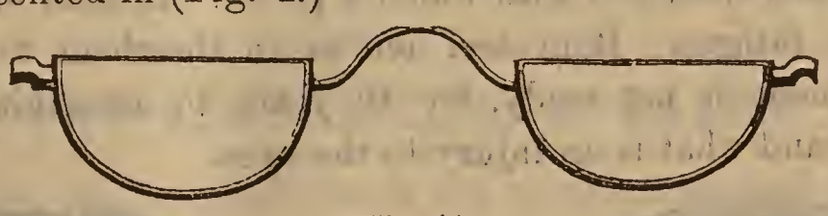
The material best adapted for spectacle frames is blue steel, which combines the advantages of lightness, elasticity, durability, and neatness of appearance. The brilliancy of gold and silver frames is objectionable, as tending to dazzle the eyes, and from this the blue steel frame is free. Some persons prefer tortoise-shell frames, but these have a heavy appearance, and are very liable to be broken. If, however, fancy incline toward them, care should be taken that the front is all black, because if it is framed of variegated shell, the dazzling will be even greater than that from silver or gold.

The front of the frame should be made to project sufficiently beyond the glasses to protect them from friction in drawing them in and out of the cases, or from being scratched when laid flat down. Many persons are very careless as to this, leaving their spectacles lying about, allowing them to become dim with moisture and dirt, and wiping them with the first thing that comes to hand—their coat-tails or pocket-handkerchief; but if

they wish to keep their glasses in a good state, they should be sedulous to clean them with wash-leather which has been freed from the yellow ochre used to color it, for this offers less risk of scratching the glasses than does silk or any other material.

One cause of the prevalence of small spectacles is to be found in the supposed interest of some opticians to prevent the use of any other kind. The reasons they allege for so doing would really be laughable, were not the injury thereby done rather too serious to be treated as a joke. Some of these gentlemen object to the large spectacles because, forsooth, they would "cut into too much shell!" others wish to know "what is to become of their old stock;" and others, again, assert that far more small spectacles are sold than ever would be were large ones worn. The shopman of one of them always recommends the small ones, but the master himself wears the large oval ones, because he finds them much more serviceable, and can see better with them. Whether the opticians are right or wrong as to their own interests in this matter, I will not undertake to say, but certainly none of these reasons are likely to have much weight with the party chiefly concerned.

The public portrait painter, and others who require to compare objects at different distances quickly and frequently, often use semicircular lenses, straight at the top, so that by raising the eyes they can see over them. This, however, causes grimaces and fatiguing elevation of the brows. These spectacles are represented in (Fig. 4.)

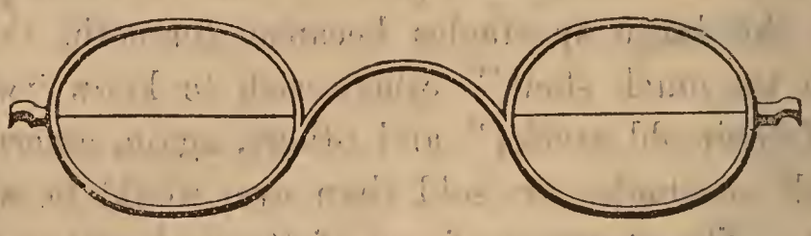


(Fig. 4.)

There is one obstacle more dangerous than all—that is, the divided glass. The lenses for divided glasses are cut in halves, and a portion of each mounted in a large circular frame; in this description of spectacles, the two segments of lenses are united as firmly as possible in the medium line, the most convex or reading lens is below, the least convex above, so that by

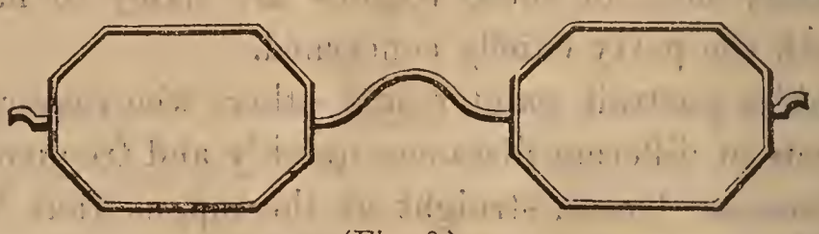
simply dropping the eyes or raising them, the person can see near or distant objects.

These spectacles are objectionable, because the medium line where they are attached together is exactly in front of the pupil of each eye. In reading the rays are on the retina, and the distant glass is on the other side of the retina, and the rays of the reading glass form before they reach the retina, which causes confusion, fatigue, and headache. The divided glass is represented by (Fig. 5.)



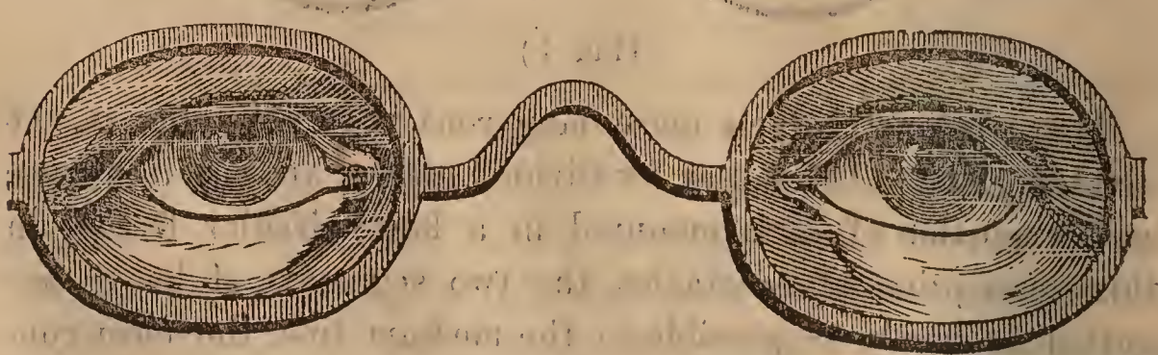
(Fig. 5.)

There is another sort of spectacle frame that I object to: that is the octagon shape, which is very small, and the eye collects a pencil of rays from each corner, which creates confusion and dazzling of objects. This is represented by (Fig. 6.)



(Fig. 6.)

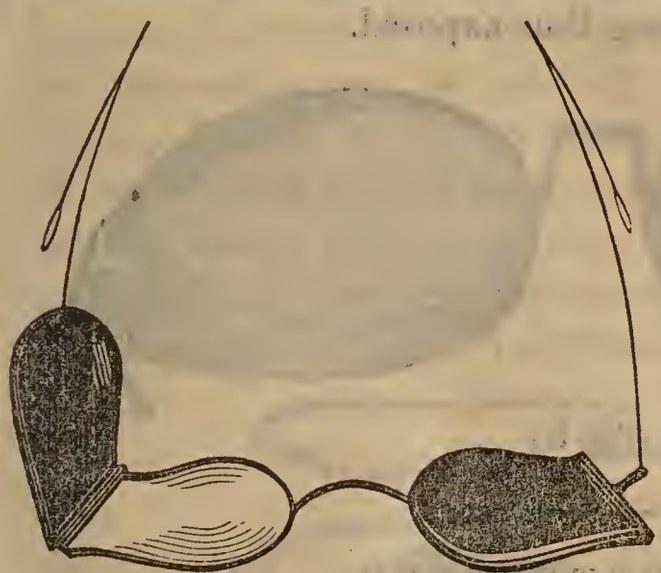
I recommend the large oval steel spectacles, which give the eye rest and ease, and with which a person can read longer and with less fatigue. Blue steel acts as an absorbant to the eye. I have made it my study, for 40 years, to ascertain what is good for and what is an injury to the eyes.



(Fig. 7)

ADVICE ON DOUBLE GLASSES.

We have represented the four-glass spectacles, opaque or colored glass slides being attached to the lens-holder of the spectacle, thus enabling one to exclude all side rays, as well as those directly in front of the eye. They were formerly made with convex or concave glasses fitted in the front of the frame, and by simply shutting down the colored plane glass sides, a tinted lens was at once formed. I highly recommend them for far and near glasses, mounted in light steel frames, four-glass spectacles to obtain a double-focus spectacle; thus: in the front frame is placed the lens which best suits for distance, and in the side frame a lens of such a power as, when combined with the front lens, would suit for reading, etc. By this method, when spectacles for distant vision are desired, it only becomes necessary to remove the side glasses from the front ones.



(Fig. 8.)

When properly suited, the rays of light are brought to a point upon the retina, and by letting the side glasses down, they also are brought to a point for reading. They do not cause confusion, headache, or dazzling.

DUST SPECTACLES, GOGGLES.

Wire-work in spectacle frames was at one time used as such, and called by this name. These dust spectacles have the disadvantage of keeping the eye behind them continually enveloped in the vapor of its own moisture, which cannot fully escape. Thus, the irritated condition is rather increased than diminished. The principal reason for their disuse lies, however, in the impairment of distinct vision, which compels the patient to strain his eyes severely in order to see surrounding objects

distinctly. By the wire-work, considerable objective light is kept away from the eye, and the frame of the dust spectacles places the translucent gauze in an unfavorable angle to the outer world, thus limiting the visual field; moreover, the manifold diffraction which the transmitted light undergoes on the wire-gauze comes into consideration. Besides, when these spectacles are worn in an atmosphere loaded with dust, the meshes of the gauze become filled, and then their defects are increased. Ordinary glass spectacles of circular shape, about an inch in diameter, are to be preferred to the dust goggles above described. Of course they protect the eye less; but where the dust is so abundant that sufficient protection is not afforded by the ordinary glass spectacles, or where a small amount of dust upon the eye proves injurious, the surgeon does well to prohibit the patient from being thus exposed.

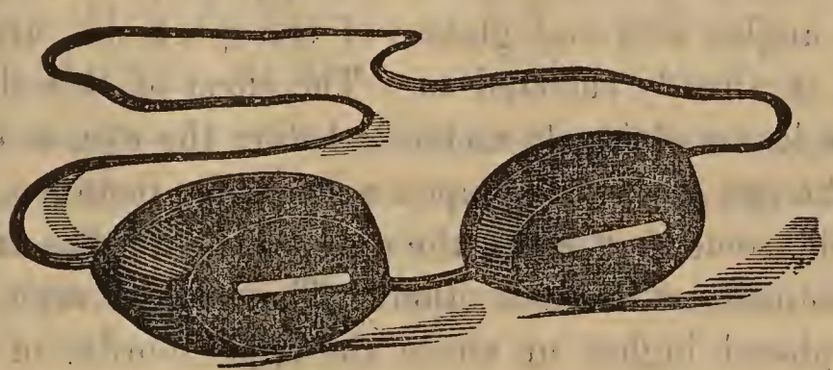
(Fig. 9.)

EYE PROTECTORS.

I now proceed to speak of those contrivances by which assistance may be rendered to eyes where the vision is impaired from accident, operation, or imperfection in form or direction. For perfect vision, it is essential that the rays of light pass through the centre of the crystalline lens, as then only is a true and correct image depicted on the retina; this cannot take place if the pupil be displaced, and just in proportion as it is removed from its natural position towards the periphery of the iris is the refraction imperfect, and, consequently, the vision confused. This almost always follows, in a greater or less degree, the operation for artificial pupil; for the very object of the operation

is to give sight by making a new opening in the iris, in cases where the natural pupil has been closed or destroyed; and the instances are few in which this can be placed exactly in the centre. Again, as the proceeding in question consists in dividing or cutting away a portion of the iris, the new pupil is devoid of that beautiful arrangement of fibres by which the contraction or expansion is provided for; it is, therefore, motionless under all conditions of light. The following are the results of many experiments made by me, for the relief of such cases:

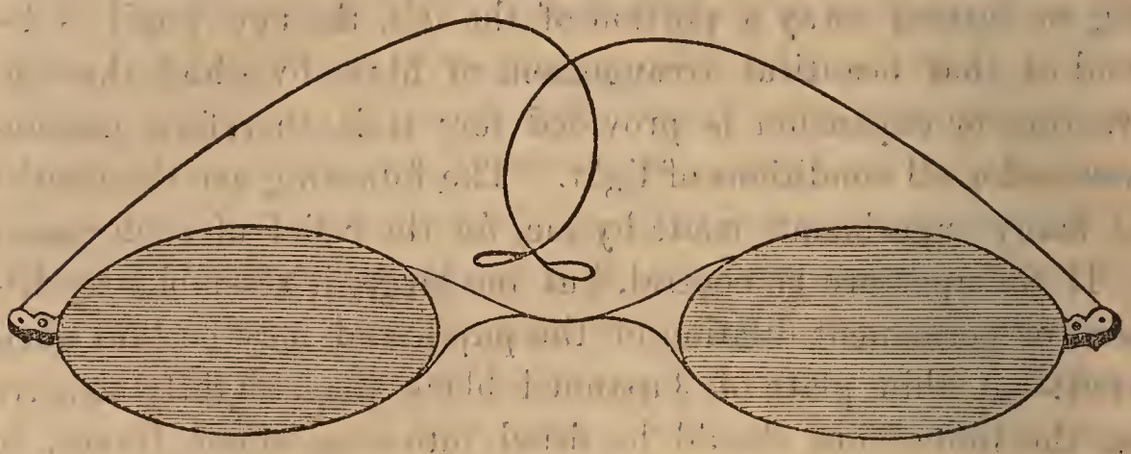
If the aperture be central, but too large, it resembles mydriasis, or permanent dilation of the pupil, and may be thus obviated:—A thin plate of Japanned black steel, slightly concave on the inner side, should be fitted into a spectacle frame; in the centre there should be a small hole, the actual size of which must be determined by experiment in each case, in order that its dimensions may be precisely those which afford the best vision. This, worn before the eye, imitates a pupil in a state of contraction, and, by limiting the light entering the eye, materially assists vision. It may, however, be more convenient to have a slit instead of a simple aperture, to admit of extended lateral vision. (Fig. 13.) represents both forms.



(Fig. 10.)

Figure 11. represents a crochet or riding spectacle. The frame is grooved into the glass, and being very light and delicate, is almost invisible; the nose piece, as well as every part of the frame, is made of the best tempered steel, and when the arms are hooked behind the ears, the glasses are held firmly to their places before the eyes; the frame is hardly felt on the

face, and can not be readily disloged from its position. The glasses in these frames are generally fine—but care should always be taken to purchase a good article, as the poorer qualities of crochet are worthless, and will last for a short time only.

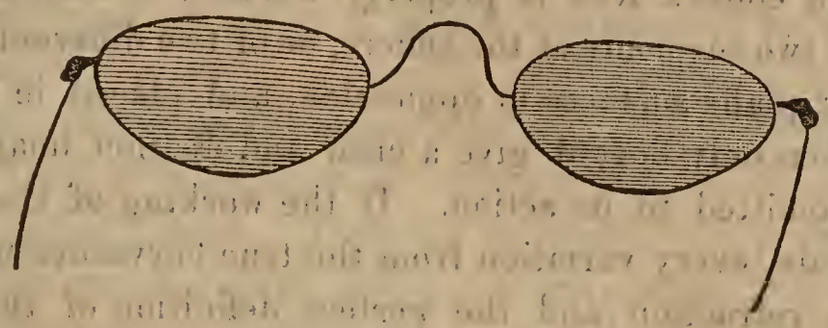


(Fig. 11.)

ADVICE ON PANTASCOPIC SPECTACLES.

We have a representation of a spectacle which is generally termed *pantascopic*. I consider it by far the best model of a frame for the far-sighted to wear. At a glance, it will be seen that the arms or branches of the frame, instead of being exactly at right angles with the glasses of the spectacles, are slightly inclined, as already referred to. The effect of this slant is to throw the lenses obliquely under or before the eye, so that upon casting the eye downwards, upon a book, for instance, the head being held somewhat erect, the optic axis and the axis of the glasses coincide with each other. The bridge, arch, or nose-piece is placed higher up above the upper border of the lens-holders than is common to ordinary spectacle frames; and the oval fenestrae or lens-holders have their upper border somewhat straightened, so as to partially cut off the upper segment of the oval usually formed in ordinary spectacle frames by this border. These dispositions of the frame allow the lenses to fall somewhat below the range of vision when accommodated for distant objects, the wearer being able to look over these borders; while for writing, reading, etc., the spectacle is ready for use at all times. These frames may readily be worn while walking, or

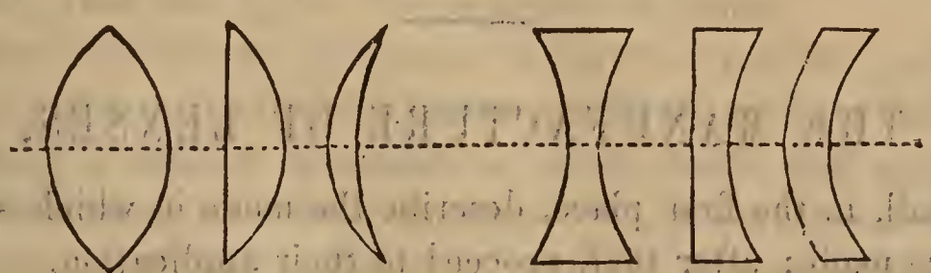
while working on distant objects, since the glasses do not interfere with distant range, which, in the common styles of spectacle frame, is very annoying.



(Fig. 12.)

THE VARIETY OF LENSES.

In order that the action of spectacles may be clearly understood, I will, before entering upon the subject, explain the effects of the different kinds of lenses upon the rays of light. There are six varieties of common lenses:—



1. The double-convex lens is bounded by two convex spherical surfaces, each of whose centres is in the axis of the lens only on the sides opposite to their surfaces.

2. The plano-convex lens has one side convex, the other plane.

3. The meniscus has one surface convex, the other concave, and the surfaces meet if continued.

4. The double-concave is formed by two concave spherical surfaces, whose centres are on the same side of the lens as their surfaces.

5. The plano-concave has one surface plane, the other concave.

6. Concavo-convex has one surface concave, the opposite convex, but these do not meet if continued.

ADVICE ON SPECTACLE LENSES.

When a convex lens is properly worked, it should exactly represent two segments of the sphere, or of two different spheres, with their plane surfaces in opposition, and placed in the same axis. Then only does it give a clear and distinct image of the object submitted to its action. If the working of the lens be not accurate, every variation from the true curvature will interfere with refraction and the perfect definition of the image, points of much importance in lenses used to assist vision.

The same remarks apply to concave lenses.

In China, rock crystal is used throughout the empire for lenses. They are ground with the powder of corundum, and when mounted, form most original spectacles, being circular and of immense size, and retained in position by silken cords with weights attached, which are slung over the ears

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THE MANUFACTURE OF LENSES.

I shall, in the first place, describe the mode in which spectacles are made; after that, proceed to their application.

The glass principally employed for spectacles and optical lenses is plate glass of the purest quality; it requires the nicest adjustment as to the proportion of its ingredients—silicate of soda, and lime; the presence of too much alkali attracts humidity from the atmosphere, causing the glass to become dull, or, in the language of the opticians, to "sweat."

The French plate glass is, in point of color, superior to the British, but has the disadvantages of softness, fraxility, and a tendency to become dull; therefore, although it is preferred by some opticians, the glass known as "British Plate" is, on the whole, the best.

The mode of making spectacle glasses and lenses generally, is as follows:—

A piece of glass, of a thickness proportionate to the convex-

ity or concavity of the intended lens, is cut into small squares with the diamond; after these small squares have had their corners snapped off they are fixed with cement to a metal tool, the concavity or convexity of which corresponds to the curve which they are intended to receive. They are then worked by hand or machinery on the smoothing tool, which latter must be perfectly true, of a radius in accordance with the focal lengths of the intended lenses. They are worked with a peculiar kind of eccentric motion, which is found to give equal friction to all parts of the surface. After the lenses have been thus gradually rounded into shape, and smoothed by emery powder of different degrees of fineness, prepared for this purpose, they are subsequently polished with oxide of tin, commonly called putty, which is laid on a polisher made of felt and cement, and formed to the curve of the smoothing tool. When one side of the lens is completed, the other side is subjected to a like process; and when both sides are perfectly polished, all that is required is to cut and grind the edge to fit the spectacle frames.

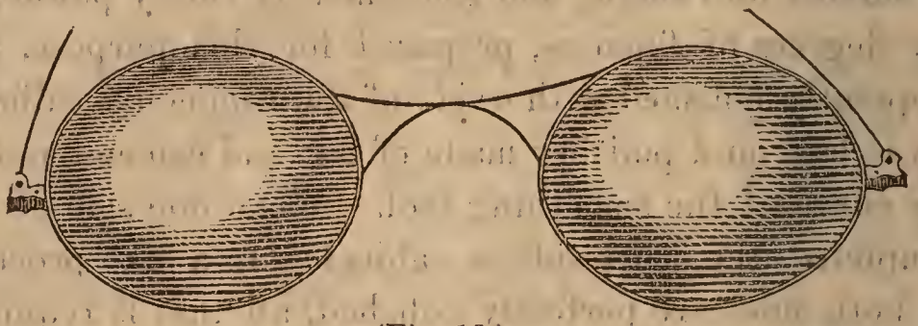
There is a common prejudice in favor of pebbles, and they certainly possess two advantageous qualities: extreme hardness, rendering it difficult to scratch or break them; and clearness, never becoming dull from moisture. They have, however, the disadvantage of being expensive, partly on account of the additional labor in making them, partly from the number of imperfect ones found in their manufacture, whereby the price of good spectacles is enhanced.

The earliest mention of artificial aid to sight occurs in the writings of Roger Bacon, who speaks of an "instrument useful to old men, and to those who have weak eyes, for they may see the smallest letters sufficiently magnified."

Mons. Spoon, in his "Recherches Curieuses," fixes the date of the invention of spectacles between A.D. 1280 and 1311. This seems to be satisfactorily made out, for a number of references to them is made in the writings of persons in the early part of the fourteenth century.

ADVICE ON COLORED GLASSES.

These glasses (Fig. 13.) are tinted and made somewhat in the shape of a watch crystal, being large and bulging, the concave surface being next the eye, and the convex or bulging surface being placed externally. The eye is entirely covered, and yet there is perfect ventilation. During the late rebellion, these Coquille glasses became very popular with the soldiery during their marches in the sun. They are in great demand among oculists, for patients suffering from excessive retinal sensibility, inflammatory affections of the eyes, etc.



(Fig. 13.)

From time immemorial, the Chinese have used, for checking the glare of the sun, a substance called *cha-she*, or tea-stone, from the resemblance of its transparent hue to a weak infusion of black tea; it is probably smoky quartz or silex, allied to the cairngorm of Scotland. In selecting this color, they have shown wisdom; for although glasses of all tinges of blue and green are to be found in the shops of opticians, the hue is called neutral tint, similar to that used by the Chinese. It does the least injury to the eyes, and for the following reasons:—

When the eye, after having been strongly impressed with any particular species of colored light, is directed to a sheet of white paper, it will not be capable of determining for some time that the paper is white, neither will it attribute to the paper the color with which the eye was impressed, but a different color, which is called its accidental or complimentary color. The following is a table of the colors, and of those which are complimentary to them:—

Color.	Complimentary Color.
Red,	Bluish-green.

Orange,	Blue.
Yellow,	Indigo.
Green,	Violet-reddish.
Blue,	Orange-red.
Indigo,	Orange-yellow.
Violet,	Yellow-green.
Black,	White.
White,	Black.

Thus, when the eye has been for some time looking through a blue glass, the retina becomes less sensible to light; consequently, the moment the blue glass ceases to be used, the retina being less sensible to the blue rays which form part of the white light flowing from the paper, the paper will appear of that color which arises from the combination of all the rays of the white light which it reflects, with the exception of the blue, that is, it will appear orange-red; in like manner, green will excite the violet-red spectrum. As colored glasses are almost always made use of to screen the eyes in cases where there is undue sensibility of the retina, anything which unnecessarily blunts the sensitiveness of that membrane (such as a particular color), though temporarily, should be avoided.

It is on this account that the neutral tint glasses are to be preferred. Being, as the name implies, of no definite color, they screen the eyes from all colors alike, and produce in the sunshine the effects of a cloudy day, which is exceedingly grateful to weak and irritable eyes.

There are two descriptions of neutral tints: a bluish-gray and a brownish-gray, and the several shades of each. I give the preference to the brownish-gray. The chief risk in selecting glasses of this description is that of choosing too dark a shade.

Neutral tinted glasses are divisible into two distinct classes of cases: those in which the retina is irritable and will not bear the excitement of light, and those cases of incipient cataract in which they assist vision simply by modifying the light and causing dilation of the pupil.

In the first class of patients, the use of too dark a shade of

glass is injurious by rendering the eye still more susceptible to light; producing, in fact, the same effect as shutting up the patient in a darkened room. The shade selected should be that which is grateful to the eye, but never darker than necessary; and if dark glasses have been in use, it will be proper to discontinue them, and to gradually accustom the eyes to the stimulus of ordinary light, by reducing the tint in successive changes.

It is advisable that persons habitually using tinted glasses should close the eyes once or twice, for a second, on taking them off, thus rendering the contrast between the shade and the light less marked.

It must be borne in mind, with reference to the darker shades of natural tint, that they are liable to heat the eyes; a black substance absorbs all the calorific as well as the luminous rays, and, therefore, sooner becomes warm and rises to a higher temperature than substances of other colors. The nearer, then the neutral glass approaches to black, the more it will heat the eye.

I may refer, *en passant*, to an experiment of my own, demonstrating the relative heating properties of black and white. I covered two patches of snow with cloths, the one black, the other white. The snow beneath the black cloth very soon melted, whilst little or no effect was produced on that beneath the white. This is a fact of practical value, for the tunics of a sensitive or morbidly irritable eye soon feel the discomfort arising from this property of dark glass, which literally, as well as figuratively, feels hot to the eye it covers.

It occasionally happens that myopic persons require the aid of neutral-tinted glasses. There are two ways of supplying the want: either by grinding the lens of the tinted glass itself, or by cementing an ordinary plano-concave lens on a tinted plane glass. The last mode is much used by Messrs. Carpenter and Westley, who inform me that the low numbers, up to about No. 6, may be cemented with the utmost nicety; but that when a higher number is required, it is preferable to have a tinted side-piece let down when required, as the inequality of the refractions, if cemented, would interfere with the perfection of the spectacles.

The desire to conceal from the world any imperfection which wounds our self-love, is inherent in the human heart, and leads to all sorts of artifices on the part of those who, by natural conformation, advancing years, or other causes, suffer from an imperfection in their vision.

CYLINDRICAL LENSES.

Conceive a lens ground with two cylindrical surfaces of equal radius, one concave and the other convex, with their axes crossed at right angles. Call such a lens an astigmatic lens; let the reciprocal of a focal length in one of the principal planes be called its power; and a line parallel to the axis of the convex surfaces, its astigmatic axis. Then, if two thin astigmatic lenses be combined, with their axes inclined at any angle, they will be equivalent to a third astigmatic lens, determined by the following construction:—

From any point draw two straight lines, representing in magnitude the powers of the respective lens, and inclined to a fixed line drawn arbitrarily in a direction perpendicular to the axis of vision, at angles equal to twice the inclinations of their astigmatic axes, and complete the parallelogram.

Then the two lenses will be equivalent to a single astigmatic lens, represented by the diagonal of the parallelogram, in the same way in which the single lenses are represented by the sides.

A plano-cylindrical or sphero-cylindrical lens is equivalent to a common lens, the power of which is equal to the semi sum of the reciprocals of the focal lengths in the two principal planes, combined with an astigmatic lens, the power of which is equal to their semi difference. If two plano-cylindrical lenses of equal radius, one concave and the other convex, be fixed, one in the lid and the other in the body of a small round wooden box, with a hole in the top and bottom, so as to be as nearly as possible in contrast, the lenses will neutralize each other when the axes of the surfaces are parallel; and by merely turning the lid around, an astigmatic lens may be formed, of a

form varying continuously from zero to twice the astigmatic power of either lens. When a person who has the defect in question has turned the lid till the power suits his eye, an extremely simple numerable calculation, the data of which are furnished by the chord of double the angle through which the lid has been turned, enables him to calculate the curvature of the cylindrical surface of a lens for a pair of spectacles which will correct the defect in his eye.

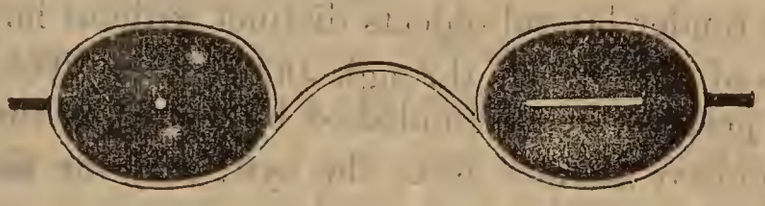
A curious case is related in the *Annales de Oculistique*, of an anomaly of vision, probably the consequences of a defect in the form of the cornea, such as that under consideration:—

Mrs. Holstrid, of Fayence, was presbyopic for horizontal, and myopic for ventricular. This she remedied by wearing spectacles, the glasses of which were cylindric bi-convexes, with rectangular, horizontal, and similar axes. These glasses obviated the presbyopic relative to the horizontal lines, and they were confined with sphero bi-concave lenses to get rid of the myopia for vertical lines. Each of the glasses were made movable, for the facility of cleaning.

The following means are recommended, to ascertain if an eye has the defect now described:—The person should attentively contemplate, for some time and with attention, a cross + three or four lines in size, made of fine wire, and fixed in a frame; if affected, he will see the horizontal lines differ in thickness and blackness of tint from the vertical.

In astigmatic eyes, vision is distributed in such a manner that the patient finds it difficult to describe his symptoms, but on testing his sight, it is evident that it had not the normal acuteness, and that it is improved in a slight degree only by ordinary concave or convex lenses. On desiring him to look at test-lines of equal length and breadth placed parallel to each other, some of them in a vertical and some in a horizontal position, he finds that he sees one set of the lines more clearly than the other. A square appears elongated to a parallelogram, and, at the same time, less sharply defined in the direction of its length. A small round hole in a screen, behind which is a bright light, seems oval or even linear. If large letters are

looked at at twenty feet distance, some of the lines will be clearly seen, while those at right angles with the first will appear blurred, or of double contours. On looking through a spectacle with a small apperture or narrow slit, held in a proper direction, the confusion disappears. (Fig. 14.) represents the spectacles:—



(Fig. 14.)

This forms, perhaps, the readiest method to ascertain the direction of astigmatism. Its degree is ascertained by placing convex or concave glasses before the slit till we find with what number vision is clearest.

Great care is required in setting cylindrical glasses; as even a slight want of correspondence between the meridian of deviation and the proper relative position of the glass almost annuls its effect. The glass is to be turned before the eye till the vision becomes clearest, and at this point should be marked by the optician, so that it may be set in the frame in precisely the same position. The frame should be well fitted to the wearer, as even a very slight obliquity or tilting of the glasses lessens their beneficial effect. For this reason, spectacles are, usually, to be preferred to eye-glasses, as they keep more steadily their proper position. The cylindrical glasses are required for all purposes; both near and distant objects seeming blurred and distorted without their aid.

PERISCOPIC GLASSES.

There are three varieties of lenses in common use for spectacles: the double-concave for short-sighted persons; the double-convex for long or aged sight; and a third description, invented and patented by Dr. Woolaston, to which he applied the term periscopic, so called from the facility they were supposed to afford for looking around at various objects without turning the

head, and so giving a wide field for vision. They were also intended to obviate the defects in common lenses, in which no objects appear distinct through them, except such as are seen through the centre. Dr. Woolaston conceived that by making each side concave towards the eye, each portion of its surface might be nearly at its right angles to the axis of vision, and would thus render lateral objects distinct without impairing the distinctness of those seen through the centre. This effect, for far-sighted persons, he accomplished by means of the meniscus, with the concave surface next the eye; and for short-sighted persons, he adopted the concavo-convex.

There can be no doubt that the advantage of a wide field is gained, in proportion as the second surface of the lens approaches to the form of the curvature of the cornea; but this is scarcely necessary, as we generally turn the head to look at an object, instead of glancing at it obliquely.

Periscopic glasses would be applicable, but they do not render vision so distinct as ordinary lenses, and they increase (although in a very slight degree) the aberration both of color and figure; therefore, the double-concave or convex lenses are to be preferred to the periscopic.

CATARACT GLASSES.

The object aimed at in operation for cataract is, either to abstract the opaque crystalline lens from the eye, to cause its absorption, or to displace it, so as to give a free passage to light. As the image formed on the retina depends upon the refraction produced by means of the crystalline lens, and on its power of self-adjustment to objects at different distances, the consequences of its loss, usually, are indistinctness of vision, and loss of power of accommodation to distance. If, prior to the formation of cataract, the eye was perfect (not merely as to its power to define objects at a given distance, but as to the power of adjustment to distance also), there is, after the operation, an incapability of discerning near objects, as the eye no longer has the power to accommodate itself to the necessary

focus. To remedy these inconveniences, double-convex glasses are employed; and it is necessary to have two pairs, of different focal lengths: one for looking at distant objects, the other for reading and writing. The following are the numbers of my test-glasses:—For reading, Nos. 2, $2\frac{1}{4}$, $2\frac{1}{2}$, 3; for distant objects, Nos. $3\frac{1}{2}$, 4, $4\frac{1}{2}$, 5. Opticians, however, have a greater variety, to suit exceptional cases.*

Where only one eye has been operated on, or where the operation has failed in one, it is convenient to have a frame with a double bridge, as in (Fig. 3.), so that it can be worn with either side up; one circle may be fitted with a reading lens, the other with a lens for distant vision; and by simply turning the frame either way, it will be placed before the useful eye.

If the sight of one eye be so imperfect that it interferes with the vision of the other, a dark neutral-tinted glass or a thin opaque plate may be advantageously fitted in the circle intended for that eye. There is considerable variety in the amount of assistance required, but glasses of four and a-half inches focus ordinarily serve for viewing distant objects, and two and a-half inches focus for reading or writing. In the selection of glasses, those of the longest focus that will answer the purpose are to be preferred. The glasses recommended by my lamented friends, Mr. Tyrrell and Mr. Dalrymple, were of three-quarters of an inch diameter, and mounted in a broad tortoise-shell rim, to diminish the weight of the spectacles and limit the quantity of light admitted to the eye.

A cataract glass, when placed in front of the eyes, gives perfect vision of objects at the distance at which they could be dis-

* The lenses used by divers, if made of crown glass and equi-convex, must have the curvatures of both surfaces equal to that of the cornea; for, in order that the refraction of such a lens may be equal to that of the cornea which it is intended to supply, the focal length of the lens in water must be equal to that of the cornea in air. It must be borne in mind that when the eye is immersed in water, the first and most considerable of its refraction is lost, for the refractive power of the aqueous humor is very nearly that of water, and so, the cornea being bounded by surfaces which are nearly parallel, the rays will pass from water into the aqueous humor without undergoing refraction. Thus, a powerful convex lens, is required to afford distinct vision.

tinctly seen before the change in the lens commenced. If the focus be too long, the patient will find it necessary, after a time, to remove the glasses two or three inches from the eyes, in order to see distinctly, and in such a case, glasses of a shorter focus must be procured. If the focus be too short, the patient will mistake the distance of objects from him, as they will appear nearer than they really are, and the hand in the effort to grasp them will fall short of them. For some time after operation for cataract, the patient (especially if young) should endeavor to do as much as possible without glasses; for although the adjusting power inherent in the eye is destroyed by the operation, nature will, if compelled, make great efforts to provide a substitute. Glasses, then, should not, under any circumstances, be permitted for a considerable time after the operation, nor, indeed, so long as vision continues to improve without them. If they be used too early, and the glasses are too powerful, the eyes may become enfeebled and require more and more assistance, so that, after a time, no lenses will be found of sufficient power.

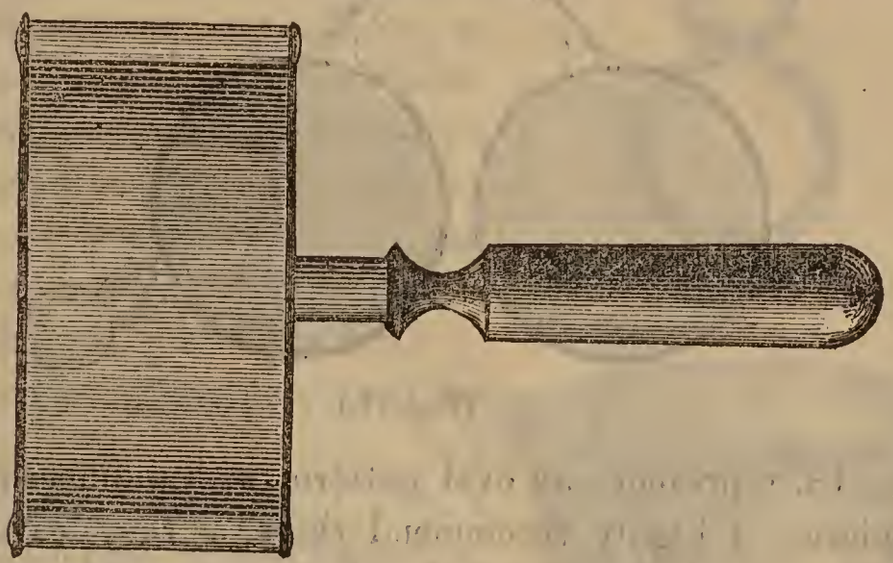
If the individual will wait until the eye has completely recovered, and will habituate the organ as much as possible to its altered state, he will then be in a condition to select glasses of a proper strength, and these, if used sparingly, will probably serve him all his life.

Supposing the axis to be absent in addition to the mydriasis, as would be the case if artificial pupil had been made for closed pupil after extraction of cataract, a cataract glass will be required in addition to the diaphragm, and the best contrivance for combining them is to have the diaphragm on a movable pivot, as in figure 15, as in the event of a spectacle frame being preferred, and in most cases it is preferable, the diaphragm should

(Fig. 15.)

be attached by a hinge to the outside of the frame, so that it can be lifted up as a side-piece, or folded down next to the eye. The object of the diaphragm being movable, is to admit of the lens being wiped, which cannot be satisfactorily done if the two are fixed together.

In many cases of cataract, hypermetropia, etc., reading glas-glasses or magnifiers are used to assist vision—the most common kind is the square reader; the lens is mounted in a frame of brass or German silver, with a wooden handle, as represented in



(Fig. 16.)

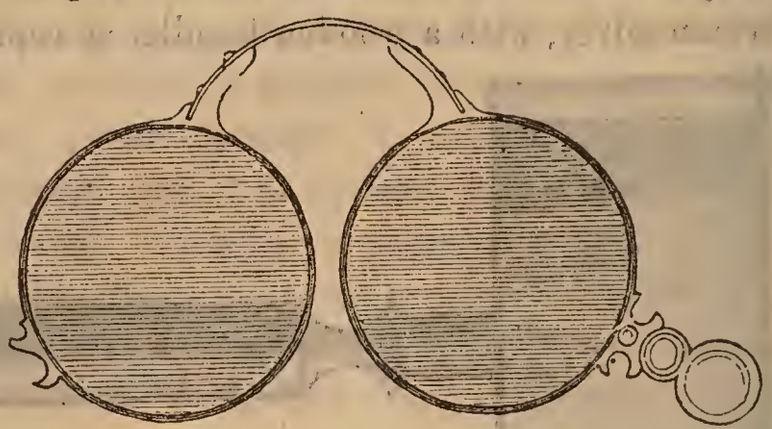
READING GLASSES.

Round eye-glasses are made of horn, shell, rubber, steel, or gold. The rubber is generally preferred, because it is the lighter and more durable; the objection to the horn and shell being that they crack very easily, and to the steel, that rust will soon destroy them. Oval frames are made of the same style.

Thus it is, that some persons prefer to use an eye-glass, in lieu of spectacles. Reading-glasses and hand-glasses are adapted for occasional use, as the elastic mounting enables them to be opened and brought into position at once; but they are objectionable, from not being firmly fixed in front of the eyes.

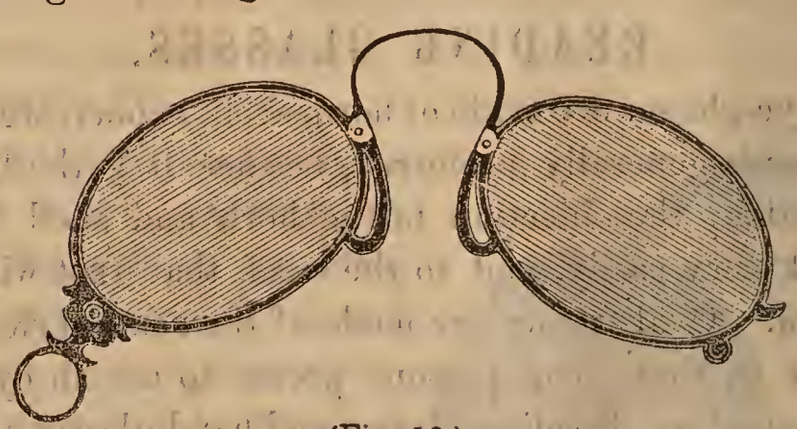
The motion of the head not being in accordance with that of the hand which holds the glasses, has the effect of trying the eyes exceedingly, in their constant and ineffectual endeavor to adjust themselves to the position of the glasses, inducing con-

siderable fatigue of the eyes, and rendering necessary an earlier resort to glasses of a higher power than would have been required had proper spectacles been adapted from the commencement. The eye-glasses which are fixed by a spring to the nose, have the disadvantage of the centres of the glasses never being in front of the pupils, and though serviceable for prompt and occasional use, are objectionable for reading, writing, or any continued occupation.



(Fig. 17.)

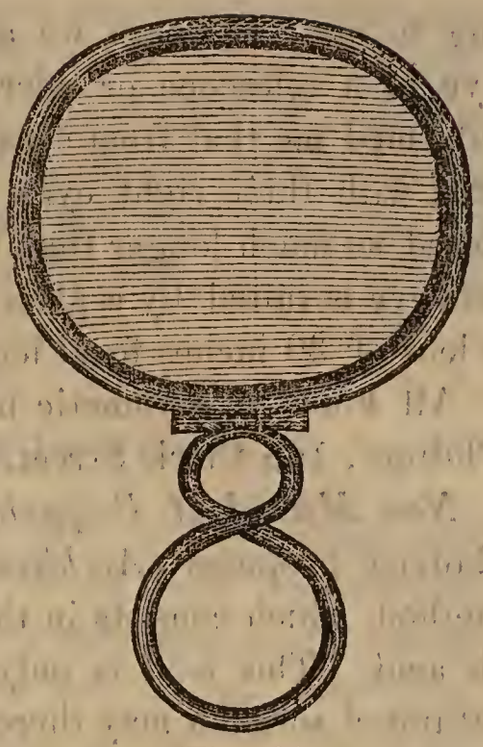
Fig. 18. represents an oval pattern, with a different style of nose-piece. I highly recommend these, as they leave no mark on the nose, and the axis of the glass corresponds with that of the eye, and gives a longer field.



(Fig. 18)

But a single eye-glass is more injurious still, and many young men who, from shortness of sight, have thought proper to use a quizzing-glass (as it is frequently termed), have had reason to repent it to the end of their lives. I am acquainted with a gentleman, the sight of whose right eye has been seriously impaired from his having in early life constantly used one of these

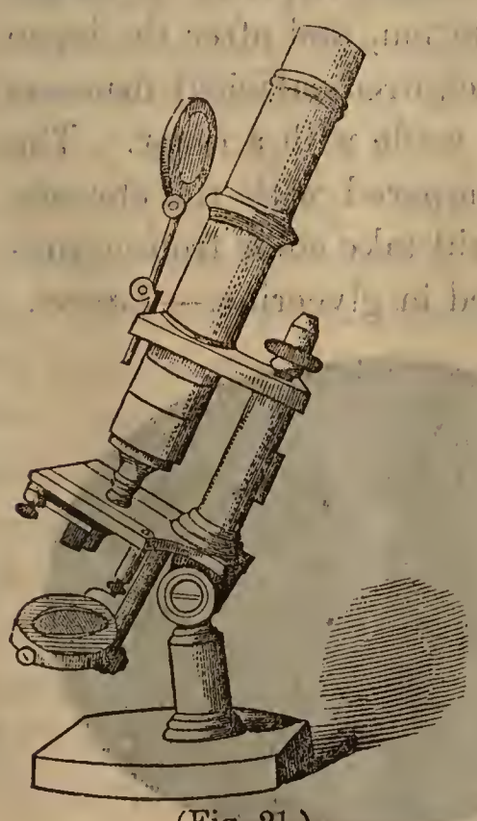
eye-glasses; and numerous other instances have come to my knowledge. The consequences to perfect vision are serious, for as one eye is made to do more work than the other, an alteration in their relative strength takes place; the result is, that, sooner or later, when a person resorts to spectacles, he finds that the lens which suits one eye will not at all suffice for the other. Watch-makers, and other artists who work with a magnifier, are very subject to this imperfection of vision, and generally find that they can see better with one eye than the other.



(Fig. 19.)

If, instead of always applying the magnifying glass to one eye, they were to use the other eye in turn, a habit which might be easily acquired in early life, though with difficulty

(Fig. 20.)



(Fig. 21.)

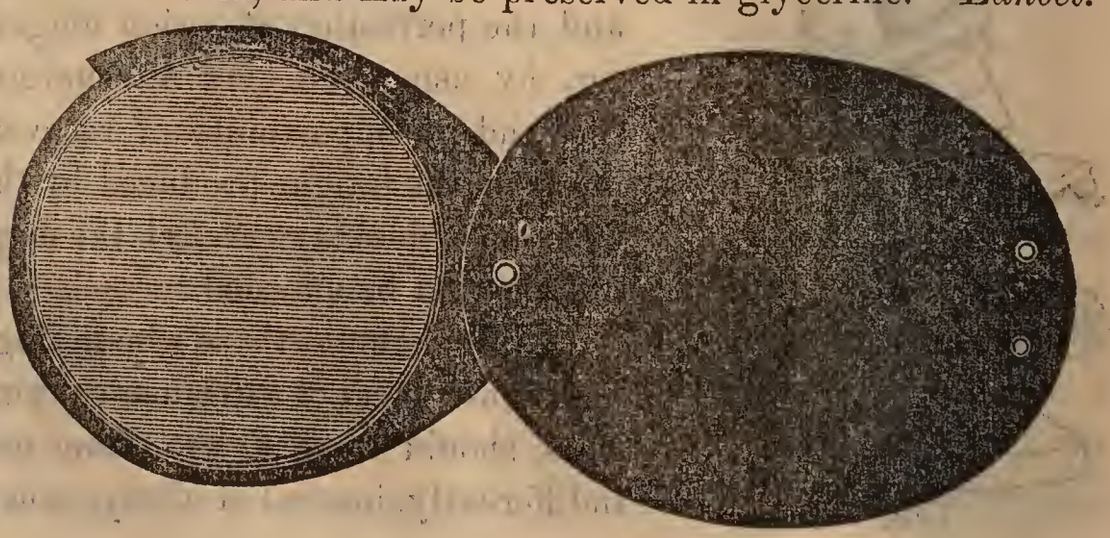
afterwards, they would preserve the power of their eyes more equally, and the perfection of vision longer; for, by using the eyes alternately, rest and an opportunity of recovering from the fatigue produced by the exertion of looking through the magnifier would be afforded to each.

In like manner, those who indulge in microscopical or astronomical pursuits, should learn to use either eye indifferently, instead of always trust-

ing to one; although we almost instinctively apply the right eye to a telescope or microscope. Many medical men have informed me that from constantly looking through microscopes, etc., with their right eyes, the focus of that eye has been rendered so much longer than that of the left eye, that while the left eye is suited by a glass perfectly plane, the right requires a lens of 30 inches focal length.

All kinds of acromatic microscopes can be had at Dr. John Phillips', 168 Clark Street, Chicago.

New Method of Preparing Objects for the Microscope.—M Rauvier proposes (*Archives de Physiologie*) a new and simple method, which consists in the employment of picric or carbazotic acid. This acid is only moderately soluble in water, and a saturated solution may therefore be employed. It possesses the further advantage of being very cheap. It is admirably adapted for all tissues containing much blood, and, therefore, for specimens, of liver, lung, etc. It appears to act by effecting coagulation of the albuminous substances, though, unlike alcohol and chromic acid, it does not occasion any fusion of the constituents of the tissue. The red globules retain their form and characters extremely well. The portion of tissues required to be examined should be plunged into the solution, and after the lapse of 24 hours it will be found to have acquired sufficient firmness to permit of very fine sections being made with a razor. The saving of time by this method, as compared with the chromic acid, is immense. The preparations will take color from carminate of ammonia, and may be preserved in glycerine.—*Lancet.*



(Fig. 22.)

Single magnifying lenses, convenient for pocket microscopes, in various kinds of mountings, from 1 inch to $1\frac{1}{2}$ inch in diameter, and from 1 inch to 2 inch focus. They are very useful for all medical purposes, for examining the eye for foreign bodies, to use with the ophthalmoscope, to examine insects, and are also used as sun-burners. Price $2,00. For sale by Dr. Phillips, 168 Clark Street, Chicago.

GLASSES FOR AMAUROSIS.

The first person who appears to have systematically used magnifying glasses as a means of restoring sight to amaurotic eyes, was a German charlatan, named Schlesinger, who visited Brussels in 1838, professing to cure weak sight, strabismus, cataract, amaurosis, etc., with glasses of his own invention. This attracted the attention of Dr. Cunier, who, after some pains, discovered the means employed by this man, which were neither more nor less than practising the eyes daily with plano-convex glasses, beginning with very high powers and reducing them, first, by quarters of an inch, then, by halves, and last, by one and two inches, till the lowest powers are reached. Dr. Cunier put this in practice, with happy effect. The following is a description of the treatment, as applied to a particular case: Madame la Baronne de R., 40 years of age, perceived that the sight of her left eye failed, without particular cause, and after eight years, during which treatment was unsuccessfully employed, she could with difficulty discern the large letters forming the heading of newspapers; neither could she distinguish the features nor the form of a person one or two feet distant. On examination, the pupils were seen to be moderately contracted, but on covering the right eye, that of the left dilated widely, aud did not reäct under the strongest light. The greenish-gray tinge often seen in long-standing amaurosis was visible deep in the eye. After a variety of unsuccessful treatment, Dr. Cunier determined to try what could be done with glasses. With No. 3 plano-convex, Madame R. recognized, though with difficulty, letters of the largest type. After some minutes' ex-

ercise, there was confusion of sight, the eye watered, and a sort of veil, thickening more and more, gray, then black, shrouded the letters; frontal pain also came on, and it was necessary to discontinue the exercise; but, on the application of cold water to the forehead and eyes, these symptoms soon disappeared. On the second day, the reading was with No. $3\frac{1}{2}$; and was practised seven times, from eight to ten minutes each time, before fatigue came on. The interval of an hour took place between each exercise. The letters were easily recognized that evening at the distance of three inches. Summary of the exercises:—

No. 3,	one day,	5	exercises of	from 2 to 4	minutes.
" $3\frac{1}{2}$,	"	7	"	" 8 to 10	"
" 4,	half day,	3	"	" 10 to 15	"
" $4\frac{1}{2}$,	"	5	"	" 10 to 15	"
" $5\frac{1}{2}$,	one day,	6	"	" 10 to 16	"
" 6,	2 days,	13	"	" 10 to 15	"
" $6\frac{1}{2}$,	one day,	6	"	" 10 to 15	"
" 7,	"	6	"	" 10 to 15	"
" 8,	"	7	"	" 10 to 15	"

The exercise was continued on the evening of the 10th day during 22 minutes. Madame de R. saw the hour by the clock at 75 centimetres, and recognized persons at double that distance. The glasses, when used, were:—

11th	day of treatment,	----------	No. 11
12th	"	" ----------	" 12
13th	"	" ----------	" 14
14th	"	" ----------	" 16
15th	"	" ----------	" 18
16th	"	" ----------	" 22
17th	"	" ----------	" 24

Each of the exercises requiring from 20 to 40 minutes. Small text was read on the seventeenth day without difficulty. Madame R. did not cease to use No. 24 until the expiration of two months, during which time aloetic medicines were taken. Ultimately, the sight of the left eye became as good as that of the right for reading, at from 12 to 14 inches, and for seeing large objects at from 10 to 14 metres.

M. Fronmüller has already reported favorably of the use of graduated glasses, and states that, by their aid, he has cured many cases of amblyopia and mydriasis. He thus explains their action:—The retina is irritated by the employment of glasses, and especially by the increase of light thrown upon it, and by the direct excitement of its function. This irritation communicated to the brain and reflected from it through the oculo-motor nerve, neutralizes the action of the sympathetic nerve, which (he imagines) determines the dilatation of the pupil, and so the disorder is overcome. This explanation will, it is feared, not be satisfactory to physiologists in general, but there can be no doubt, whatever may be the *modus operandi*, that in many cases of amblyopia, either from disuse of the eye, or from deficient energy in the retina, the careful and judicious employment of glasses is attended with excellent effect. The plan which seems best, is to commence with such power as enables the person to see large type; to rouse, but not fatigue, the retina by repeated exercises, short in duration at first, but gradually increased in length; and to reduce the power of the glasses by very short steps, so that each glass, in succession, may establish and improve upon the effect produced by the former. Simple though the plan is, it requires caution, should not be adopted without consideration, and the practice should be carried on under the superintendence of a competent authority.

In the first instance, the largest type may be required, but its size should be diminished in proportion as the dormant sensibility of the retina is aroused. The exercises should be performad in a good light; and after each, the eye should be bathed with cold water, if practicable, by means of an eye-fountain.

In cases of strabismus, where the sight is imperfect from disuse, the practice with the glasses may be concurrent with that recommended to strengthen and equalize the muscles; and in cases of amaurotic insensibility, treatment calculated to remove any functional derangement which may tend to keep up the disorder of the sight, ought to be carefully employed.

ASTHENOPIA.

There is a condition of the organs of vision in which they are unable to sustain continued exercise upon near objects, although the patient, on first viewing such objects, generally sees them distinctly and clearly. But after a time, varying in different subjects from a few minutes to an hour, a sensation of constraint affects the eyes of some, whilst others complain of a feeling of tension or of weight, with heat, running of water, and double vision, accompanied with a feeling of fatigue in the eyes and headache, confusion and obscurity having spread over the objects which had been previously clear and distinct. These persons can employ their sight for any length of time in viewing distant objects, and present no external appearance of disease of the eye. This affection of the eye is called "asthenopia," or weak-sightedness, and is often mistaken by both physicians and patients for "amaurosis," and treated accordingly; but there is no necessary connection between the two diseases, nor does the one lead to the other.

Asthenopia generally affects the two eyes pretty equally. If only one eye is affected, and the other good, the disease is apt to pass undetected. Asthenopia rarely commences in those who have reached the middle period of life, but almost exclusively takes its origin in childhood or youth. The habit of body of asthenopic patients is generally delicate, for we rarely, if ever, meet with the disease in robust or plethoric subjects. Females are as frequently the subjects of this disease as males.

There are certain diseases of the eye, with which asthenopia is very apt to be confounded, such as photobia, or dread of light; myopia, or short-sightedness; presbyopia, or long-sightedness; night or day blindness; amblyopia; and incomplete amaurosis. On the other hand, it is by no means uncommon to find asthenopia complicated, either with some other disease of the eye or with some general disorder of the nervous or of the circulating system. Asthenopia is often attended by considerable depression of the powers of the mind as well as those of the body, and the disease becomes seriously aggravated by the

mental apprehension of the patient. In order to allay these gloomy forebodings, a careful and thorough examination should be made, so as to become satisfied whether there is any disease complicated with the asthenopia that is likely to destroy or seriously impair the vision. If there is not, assure the patient, in the most confident way possible, that he need not have any apprehensions about being blind; that, in fact, he could not become blind from the asthenopia if he were to try. A patient thus relieved of the terrible apprehension of becoming blind almost invariably improves.

The cause or causes of asthenopia are somewhat wrapped in obscurity. In many cases, it appears to be an idiopathic disease, resulting entirely from over-exertion of the sight; working by artificial light, as in night-work of all kinds, and especially in night-study; want of sleep is sometimes the chief agent in producing the disease; prolonged investigations with the microscope, is sometimes the cause of asthenopia; undue exercise of the sight, while a person is convalescing from some general and acute disease; what may be called the fashionable and hothouse education of modern times, is a fruitful source of this disease; the ophthalmia of childhood or of youth may give rise to it, particularly scrofulous inflammation of the eyes; injuries of the eye, and, still more readily, injuries of the branches of the fifth nerve around the orbit, are apt to give rise to asthenopia; asthenopia is often traceable to affections of the brain; the teething of children, any malignant disease of the body, excessive venery, masturbation, spermatorrhœa, congenital imperfection in the organs of vision, a bent position of the body during work, constipation, dyspepsia, agitation, grief, sudden fright, and the use of narcotics, such as alcohol, opium, or tobacco, which tend to blind all our sensitive and motive powers; in fact, debilitating influences of every kind, are apt to aggravate, if not induce, asthenopia.

Different definitions are given of this disease: McKenzie calls it "incapability of sustaining the eye in adjustment of near objects;" Lawrence says, "an affection of the retina from excessive employment, commonly called weakness of sight;"

and Stellwag defines it, "first, the inability to keep the dioptric system or the visual lines, for a long period, directed to near objects; and, secondly, in close pathological relation to this condition, hyperæsthesia, or exalted sensibility of the retina and ciliary nerves." This definition of Stellwag's is, undoubtedly, the best of the three; but it does not fully define the disease called asthenopia, for there are cases of refractive errors and muscular disturbances not properly of the ciliary muscle, as well as cases in which neuralgic symptoms predominate, which cannot be included in this definition.

Success in the treatment of this disease depends, to a very great extent, upon its cause; if it has originated from disease of the brain, from injury to a branch of the fifth nerve, or from one of the ophthalmiæ, the prognosis would be somewhat unfavorable. If the disease is connected with plethora or local congestion, the prognosis is better; but if the patient is much debilitaed or of a scrofulous constitution, it is very unfavorable. In some cases, it is our duty to declare the disease incurable, and give a reason for this opinion. There are, however, a great many cases of asthenopia which are amenable to treatment, and this treatment will depend, to a great extent, upon the cause of the disease and the constitutional strength or infirmity of the patient. As a general principle, the patient must endeavor to desist from everything which has a tendency to weaken the nervous system or exhaust the organs of vision. Luxury and indolence should be avoided, and, instead, should be substituted early rising, a hard bed, plain and wholesome food, abstinence from the use of alcohol and tobacco and other bad practices, with plenty of exercise in the open air of the country. The application of medicines, either locally or generally, must depend entirely upon the judgment of the physician who will be guided by the nature of the case, its cause and present symptoms, and by the constitution and present condition of the patient.

Certain cases of asthenopia can be cured by the use of convex glasses, a strong proof that the seat of the disease must be, in part, the apparatus of accommodation, for the employment

of such glasses relieves the eye almost as completely as it does that of presbyopia. When the patient has procured his glasses, which he should never do without the advice of a good oculist or optician, let him use them in the way and manner prescribed for him by his adviser, and he will find a marked improvement in a short time, which will inspire him with hope and zeal for further and permanent benefit. I, myself, during a practice of 40 years as an oculist and optician, have cured hundreds of cases by the aid of convex glasses, conjoined with medical treatment, such as stimulating embrocations, etc., etc., etc.,

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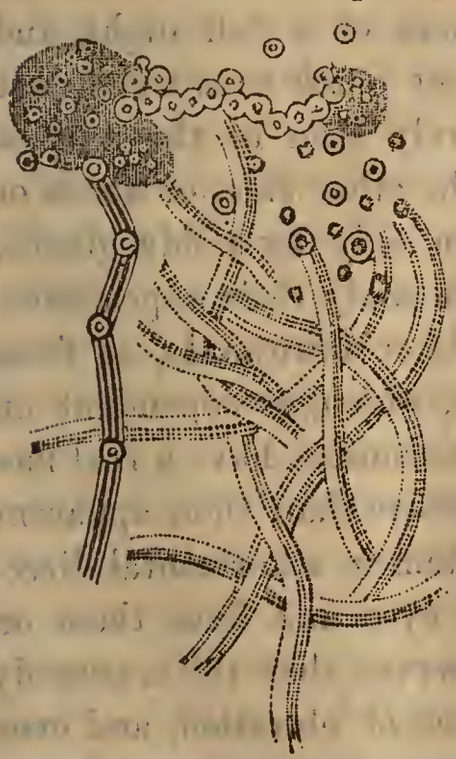
MUSCÆ VOLITANTES.

Muscæ volitantes appear to the patient who has made no particular examination of them, under the form of blackish motes, or of a thin film, like the wing of a fly, or of semi-transparent grey threads, like spider's web; but if viewed attentively against the clear sky, a white wall, or the like, they are recognized to be made up of appearances such as the following; —



(Fig. 23.)

1st. A convoluted string of beads, or a convoluted transparent tube, containing in its interior a row of beads smaller than its diameter, except here and there where one larger than the rest is seen occupying its whole diameter, the end of the string or tube sometimes presenting a dark, knobbed extremity as if formed by an aggregation of the beads composing the string, or contained within the tube.

2d. Insulated beads, some of which, and these the more frequent, have a well-defined outline; others, and these rarer, have an indistinct outline; and,

3rd. A parcel of flexuous, round, watery-looking or spun-glass-like filaments, with dark contours, often divided inferiorly into truncated branches.

These different appearances may be seen altogether, the beaded appearance on one side of the parcel of watery-looking filaments, and interspersed, here and there, the insulated beads, one or two of the well-defined of which often appearing as if attached to the outside of the beaded tubes; or some one of the appearances may be seen principally or exclusively. According as the distance of the object against which the muscæ volitantes are viewed is greater or less, they appear larger and fainter, or smaller and more distinct. Vision is not affected by floating muscæ. Between the several portions of the muscæ and by the side of them, the eye still sees everything with perfect distinctness. Even the portions of the retina, over which the shadows which cause the appearance of the muscæ fall, are found by the patient, when the corpuscles ascend out of the field of vision, to be perfectly sensible.

Muscæ volitantes are often detected suddenly, and thus supposed to have just occurred. They are most observed when the patient looks at the clear sky, a thin cloud, snow on the ground, a white wall, or the like. They are not much, if at all, noticed under the opposite circumstances of a dull night, and looking at a dark object. They are not much seen when near objects are looked at. They are rarely seen in the axis of vision, but generally seen to one or the other side, or above or below. The patient thus seeing them only by a side glance, finds it difficult to fix them in order to study their appearance. They move as the eyes move, upwards or downwards, or from side to side; but besides this motion, which, as dependent on that of the eye, is merely apparent, the muscæ have a real motion of their own, and still more extensive than their apparent motion. Thus, if from looking before him in a horizontal direction, the patient suddenly raises his eyes and fixes them on some object above the horizon, he observes that the muscæ fly upwards, considerably above that degree of elevation, and even beyond the field of view, and then come sailing down before him, till they disappear below. Besides the motion of ascent and decent, the muscæ volitantes under consideration present lateral movements, although less marked, as well as changes in the relative positions of their several parts.

Nature of Floating Muscæ.—Hitherto, a very common opinion as to the nature of floating muscæ has been, that they are subjective sensations, depending on some intrinsic change of state of the optic nervous apparatus, thus confounding them with mixed muscæ; but that they are truly objective sensations, occasioned by the presence of particles in the interior of the eye, but extrinsic, and in front of the retina, throwing their diffracted shadows on the retina, admits of mathematical demonstration. But, without entering minutely into the matter, the matter may be easily demonstrated thus:—Hold between a convex lens and the white surface on which the image of the light falls, some small object, as a pin. When this is near the lens, its shadow is not seen on the white ground, but when it is brought nearer and nearer the white surface, its shadow appears more and more distinctly.

The particles, moreover, appear to be of normal occurrence in the eye, for the appearance of floating muscæ may, in general, be seen by any person by simply looking through a small aperture in a card at the clear sky, or through the eye-glass of a compound microscope at the flame of a candle two or three feet distant, or simply bringing the eyelids towards each other, and looking at a lighted candle.

Nature of the Particles, the Presence of which Occasions Floating Muscæ.—This has not yet been with certainty determined. In the vitreous humor (as also in the aqueous) there is contained a great number of corpuscles, most of them resembling lymph-corpuscles, though smaller, being between $\frac{1}{4000}$ and $\frac{1}{5000}$ of an inch in diameter; but it appears from the calculations of Brewster, Mackenzie, and Reute, that the size of the particles, the presence of which occasions floating muscæ, is much greater than this. Muscæ volitantes are often seen by persons without any particular notice of them being taken, as they are distinct, present themselves occasionally only, and are therefore not troublesome. Their appearance in cataract is owing to the opaque lens acting much in the same way as the perforated card.

They are seen most distinctly, and are, therefore, most trou-

blesome, when there exists an irritable state of the retina, with weakened irradiation. Such a state of the retina may therefore be viewed as the general condition on which floating muscæ, considered as a disease depend. Dilution of the images of external objects favors, distinctness, on the contrary, prevents the perception of muscæ. Hence, when the person is short or far-sighted, they appear far less evident to him when he uses the glasses fitted to render his vision distinct. This appears to be owing to the stronger impression of the external objects making up for the weakened irradiation, so that the weak impression of the objects of the muscæ is more readily effaced. The pupil of an eye affected with muscæ volitantes is generally contracted, even when the eye is myopic. From what has been said, it will be seen that the occurrence of floating muscæ is of itself no indication that either cataract or amaurosis is taking place. If, however, there be along with the appearance of muscæ a failure of vision, and if that failure be not attributable to myopia or presbyopia, which may be ascertained by a concave or convex glass not improving the vision, then cataract or amaurotic amblyopia may possibly exist.

In uncomplicated cases, the muscæ may indeed increase in numbers, but very slowly, and never to such an extent as to interfere with the distinctness of vision in any very troublesome degree. But sometimes the muscæ remain stationary, or even become less. A question which the patient is very likely to put to us is, whether the floating motes or threads which he sees are not liable to increase, and that to such a degree as at length to deprive him of sight. That they increase is true, although only very slowly, and never to such an extent as materially to interfere with vision. Even when the whole field of vision presents entohyaloid spectra, the patient is still able to read, although, as he continues to do so, the muscæ sometimes gather together, so as to render portions of the page before him temporarily obscure. Very often they remain stationary for ten or twenty years, or increase by almost insensible degrees; and although alarming at first, the patient gets habituated to them, and troubles himself no more about them. I believe the

increase of myodesopsia arises more from the eye becoming in a greater degree susceptible to the impressions of the bodies which cause the disease, than from any increase of the bodies themselves. This increasing susceptibility arises from over-use of the eyes, and from searching for and examining the muscæ too much.

Many authorities might be quoted, to prove that entohyaloid muscæ increase only with extreme slowness, and sometimes become even less perceptible. "I know many people who have complained to me of such things fifteen or twenty years ago, and who are still in the same state."

"These kinds of phantoms, which increase very slowly during the first five or six years, continue during the whole remainder of life without any kind of inconvenience. * * * I know a great number of persons who have seen them thirty, forty years, and more, without their number or their figure having undergone the slightest change."

"It is certainly for from twenty to thirty years that I have seen these same appearances," says Prevost, at the age of 50; and at the age of 79, he adds:—"Since, up to a very advanced age, I have enjoyed very good sight, I may support, by my case, the opinion of the oculists who reckon these appearances of small importance."

"They are quite innocent in their nature, and exist in persons whose powers of vision are most acute. I have been subject to them from childhood."

Treatment of Entohyaloid Muscæ.—Entohyaloid or floating muscæ are not much under control, and are very seldom removed by medical applications. If of old standing, and not increasing it is needless to interfere. When of recent origin, and the exciting cause evident, they are sometimes cured. The treatment most likely to be useful is as follows:

1st. The patient must be put on his guard against the exciting causes, and carefully avoid them; such as too much straining of the sight, excess of every sort, night-watching, and the use of alcohol in any form or quantity. "The only means which often does good in this disease," says Dr. J. B. Walker,

of this city, "is rest of the eyes, and refraining from every employment which strains the sight. I know patients who have got completely free from muscæ volitantes which they had seen for several years, by long-continued rest, which, however, again appeared, as soon as they wrought for some days, so as to strain their sight."

2d. If the stomach is weak and the bowels costive, a course of laxatives, followed by tonics, should be prescribed. To strengthen the constitution, and especially the nervous system, should by every likely means be attempted. This indication will best be answered by cinchona, steel, and the cold bath.

3d. A torpid state of the liver requires small doses of the blue pill, either by itself or combined with purgatives. I have known a gentle course of mercury successful in curing the disease, probably by its sorbefacient powers. Iodide of potassium I have also found completely successful in removing muscæ volitantes of recent standing.

4th. Where the symptoms of determination of blood to the head are well marked, venesection or arteriotomy, leeches to the head, or cupping and counter-irritation are indicated. Of twelve cases treated by Dr. Schlagintweit, eight, we are told, were cured by solvent and derivative medicines, and by bleeding at the foot.

5th. When muscæ appear to depend on disease of the heart, leeches are recommended, by Mr. Wardrop, to be applied over this organ till its impulse is diminished. The fulfilment of this indication may be promoted by small doses of antimony and the use of laxatives. If the patient complains of cold feet, the warm pediluvium is to be used at bedtime; and it may be remarked that this simple remedy is of great importance, where the disease is connected with a difficulty of obtaining sleep.

An irritable state of the heart, remaining after its impulse is subdued, Mr. Wardrop endeavors to remove by the exhibition of sulphate of iron.

6th. Antispasmodics appear to have been chiefly confided in by Ware in the treatment of muscæ; such as, two or three times a day, a small dose of the volatile tincture of valerian,

mixed with an equal quantity of tincture of castor, and joined occasionally with the camphor mixture, or with the infusion of cascarilla.

7th. Exercise in the open air, and a change of residence, and such occupations and amusements as are likely to withdraw the mind from any source of anxiety and distress, are found to be beneficial. A course of mineral waters has sometimes been successful, probably more from the change of scene, hilarity of mind, exercise of body, and regularity of habits, by which such a course is accompanied, than from the effects of the waters themselves.

8th. If the eyes feel hot, heavy, or uncomfortable, they should be bathed with either some cold or warm application, according as the patient feels one or the other more agreeable. Cold water, or a cold lotion, consisting of water with a small proportion of spiritus ætheris nitrosi, will answer in the one case; tepid water, or a tepid infusion of any aromatic herb, in the other. Sponging the forehead, temples, and outside of the eyelids, morning and evening, with a camphorated tincture of rosemary, eau de Cologne, or the like, is also recommended.

GRANULAR INFLAMMATION, OR GRANULATED EYELIDS.

(Fig. 21.)

This is one of the most frequent, and by far the most obstinate, of all the diseases to which the eye is subject. It is to be found in all places, and among all classes of people, and is very prevalent throughout the wide Western prairies. Thousands upon thousands are at this moment sufferers by this terrible destroyer of the human eye, and thousands are now groping their weary way in darkness, never again to behold the face of man, or to witness the rising or setting of a summer sun. This disease, which so effectually and certainly destroys the sight in the course of its natural career, may generally be recognized, after it has become fairly established, by the following appearances:—

Its commencement is marked with the usual indications of inflammation, such as itching, and soreness in the corner of the eye, and oftentimes not characterized by much severe pain. It usually attacks one eye first, and the second soon follows; and the last eye attacked is often much the worst. In the course of a few days, or sometimes in a day from the first appearance of the disease, the eyes will be filled with adhesive matter, gluing them firmly together during sleep. The first, or inflammatory stage of the disease, which is not usually very severe, soon passes over, and the eyes begin to feel much more comfortable; still, they do not get well, and every change of weather, from dry to wet, or from heat to cold, is likely to produce an unfavorable change in the condition of the eyes. The sight becomes dull and misty, and the lids not more than half uncovering the organ. The mist now increases, and the eyes grow weak and sensative to the light.

This characterizes the forming stage of granular inflammation; and now, if the eyes be carefully examined, as follows, the true character of the disease will be readily discovered.

(For the treatment of this disease, I refer to my book on "Ophthalmic Surgery.")

PURULENT INFLAMMATION OF THE EYES OF NEW-BORN INFANTS.

This disease, though not of very common occurrence, is occasionally met with, and from its dangerous nature requires a passing notice.

It commences with a light-yellow or straw-colored discharge, which gathers at the inner angle of the eyes, and glues them together. In the course of two or three days, the lids begin to swell and puff up, matter increases, the ball seems to protrude, and the eye becomes very sensitive to light; and in bad cases, the delicate membrane which lines the entire socket becomes so enormously tumefied and swollen as to protrude through the lids, while the eyes are so completely concealed from view by the swelling that they cannot be examined, even by the greatest exertion. This stage exists but a very short time, for the delicate *cornea*, or front of the eye, mortified, in part, or wholly so —generally the latter—and then the disease begins to subside; *one or both organs having been completely destroyed* by the rapid course which it usually takes. Whenever the premonitory symptoms of this disease present themselves in the infant, it should be promptly treated by those who understand the nature and danger of the case.

DISEASE CONTAGIOUS.

This disease is readily contagious under favorable circumstances, and frequently attacks whole families within a few days of each other. Children as well as adults suffer severely from this disease, and if not promptly met in these young subjects, it is almost sure to eventuate in the loss of one or both eyes. The disease, however, I consider, is not so violent in this country as has been described in the foregoing statement, except in a few rare instances. I *have* had cases of this description within the last three years, where the disease had appeared only 48 hours before I saw the patient, yet both eyes were completely ruined, and the whole organ in a complete state of mortification.

In some cases the disease is slight and disappears by simple means; in others it extends to the adjoining parts of the eye, and the sight is greatly injured or perhaps entirely destroyed—thus indicating the necessity of attention to the slightest attack, as such untoward consequences may result from neglect.

Treatment.—In mild cases, aperients, abstinence from stimulents, and either warm or cold application, as is most agreeable to the patient's feelings, is all that will be required. A soothing, warm application may be made by boiling 2 ounce of poppy heads in one pint of water; or 20 grains of extract of opium may be dissolved in half a pint of warm water, and 2 ounce of spirits of mindererus, added thereto—10 grains of pulverized mur. ammon; 10 grains of pulverized alum; 10 grains of acetate of zinc; 10 grain each to a pint of water—this will make a suitable cold lotion. A single fold of linen cloth, saturated in this solution, must be laid over the eye, and frequently changed. Never apply poultices or compresses to the eye; they increase the heat and inflammation, and prevent a free circulation of air round the eye. If the light is hurtful to the eye, I recommend neutral tinted glasses to modify the light.

Cases have occurred where both eyes were totally destroyed in 24 hours, although the attack was not accompanied by much pain.

The acute form frequently degenerates into the chronic. This also arises very gradually and almost imperceptibly from any of the causes mentioned in the last chapter, from tumors within the eyes, granular lids, or from the eyelashes growing inwards.

Symptoms.—The bloodvessels have lost their natural tone, are enlarged and distended; the eye is weak and watery, and there is more or less irritation. The lids frequently are glued together in the morning by a discharge of adhesive matter that accumulates during sleep.

The treatment must be directed to the removal of the cause and the strengthening of the debilitated vessels. For the latter purpose, take

Sulphate of Copper, ---------- 3 grs.
Sulphate of Morphine, ---------- 2 grs.
Water, ---------- 1 oz.
Mix

Or,

Sulphate of Zinc, ---------- 4 grs.
Rose Water, ---------- 1 oz.
Morphine, ---------- 1 gr.
Mix.

Drop one or two drops of either of these into the eye, night and morning, and apply, before going to bed, a small portion of glycerine ointment to the edges of the lids; and if there is much pain, I recommend tincture of iodine, as an embrocation around the temple and forehead, every two or three days.

Before applying the remedies night and morning, wash off with a little tepid water and a linen cloth or sponge any matter that has collected about the roots of the eyelashes. This should be carefully and completely done, otherwise the application will not reach the affected parts. After washing, as above, use the eyewater; carefully dry the eyes with a piece of linen, and then, with the finger, rub the salve gently, but thoroughly, into the sides and roots of the eyelashes.

If these remedies do not produce the desired effect, the patient must seek further advice.

EGYPTIAN OPHTHALMIA.

A FRIGHTFUL DISEASE.

I will now endeavor to give a brief statement of the character and consequence of some of the diseases of the eye most commonly met with in this Western country; but the nature of this work will barely admit of my doing more than simply refer to them, and to show to what an alarming extent they sometimes advance.

Symptoms.—Egyptian ophthalmia is a most frightful form of inflammation of the eye. It is rapid in its progress and destructive in its effects. The symptoms which characterize the disease are, at first sight, redness, and sensation of heat. The organ soon becomes painful, and has a feeling as if sand and dirt had

got into the eye. Itching is also experienced more or less, and at night the eye will be glued together by the formation of matter. The pain and redness increases, light becomes dull, with more or less headache, water and matter are both abundantly poured out, and sometimes, in the course of *two* or *three* days, the eye will be lost by the excessive swelling of the membrane and consequent mortification. One eye is usually much worse than the other; and after it has been lost, the disease may abate, or if badly managed, may continue its destructive work till the other has been lost also.

SIMPLE INFLAMMATION.

Simple inflammation of the eye, arising from cold and other causes, is also frequently to be met with, and is of course attended with a great variety of changes in the course of progress, depending on circumstances, and on the habits and constitution of the patient.

Inflammation from such causes is readily curable, if taken in good time, but too often the disease is meddled with and irritated by improper treatment, so that what was of itself a very trifling disease is often converted into one troublesome and tedious. *Diet* and *rest*, both of the body and of the diseased organ, with a little opening medicine, will suffice in most instances to put the trouble aside, if begun in good season; some cooling lotion or cold water, or a little alum and water, may also be used as a local application; and when this does not suffice, rest assured it is no trifle, and the sooner you consult a competent person the better.

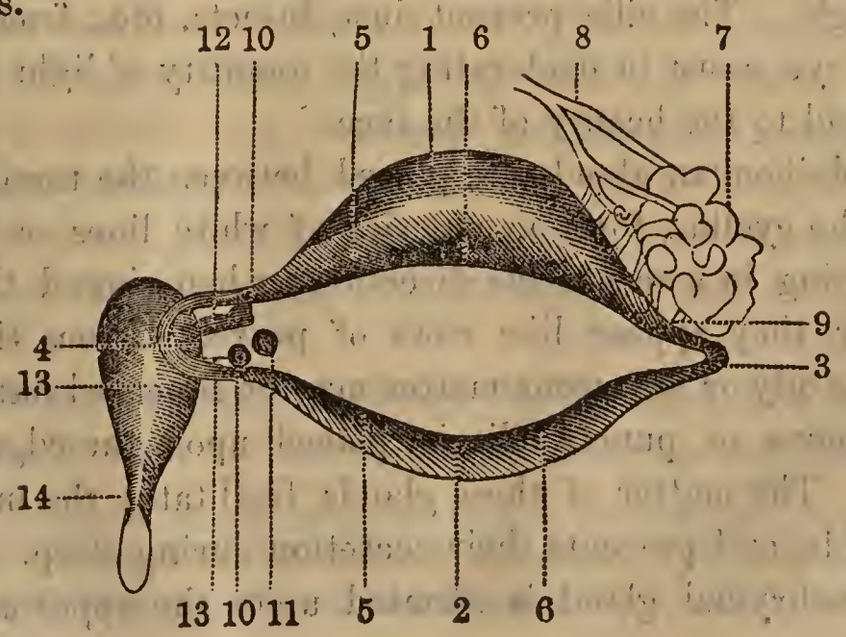
DISSECTION OF THE EYE.

The eyes constitute the organ of vision; they are situated in the cavities of the orbits, and surrounded by several parts to protect them from injury, and assist in the performance of their various motions.

The orbits are of a conical figure, situated in the fore part of the cranium, formed of the different processes of the following bones:—

The upper part of each, by the orbitar plates of the frontal bone; the inferior, by the superior maxillary bone; the internal, by the orbitar part of the os unguis and pars plana of the ethmoid bone; the external, by the orbitar plates of the sphenoid and malar bones; the posterior, by the sphenoid and palate bones. The cavities of the orbits are lined with productions of the dura mater, which pass the foramina optica and lacera, and, at the anterior edges of the orbits, join the periosteum of the face, where they supply the place of ligaments to the palpebræ.

The eye consists of the globe, or ball, and its appendages. The latter consists of the muscles, nerves, arteries, and lachrymal apparatus. The eye is protected by the superior and inferior palpebræ; the superior consists of the skin, fibres of the orbicularis palpebrarum, tarsal cartilage, fibres of the levator palpebræ superioris, and the tunica conjunctiva; the inferior, of the same parts, with the exception of the levator palpebræ superioris.



The preceding diagram is intended to point out the lachrymal apparatus:—

1. The superior tarsus.
2. The inferior tarsus.
3. The external canthus.
4. The internal canthus.
5. The cilia, or eyelashes.
6. The situation of the Meibomian glands.
7. The lachrymal gland.
8. The lachrymal artery ramifying upon it.
9. The lachrymal ducts.
10. The two puncta lachrymalia.
11. The caruncula lachrymalis.
12. The lachrymal ducts.
13. The lachrymal sac.
14. The ductus ad nasum.

The tarsi, a thin cartilaginous arch, situated in the edge of each eyelid, the upper one being considerably broader than the lower, and each broader at its middle than towards its extremities. They terminate at a little distance from the inner angle of the eye; their edges are so placed, that when the eyelids are shut, a groove is left near the eye, by which the tears are conveyed towards the nose. The tarsi serve to keep the eyelids extended, allow them to be accurately applied to each other, and prevent them from being collected into folds.

The canthi are the union of the two tarsi; by some they are called the tarsal ligaments. The internal one is much larger than the external, and contains the two puncta lachrymalia and caruncula lachrymalis.

The cilia, or eyelashes, are small, stiff hairs placed on each side of the eyelids. Those of the upper lid are bent upwards, and are considerably longer than those of the under lid, which are bent in the opposite direction: they are wanting near the inner angle. The cilia prevent dust, insects, etc., from getting into the eye, assist in moderating the quantity of light sent into it, and add to the beauty of the face.

The Meibomian glands are placed between the tarsi and lining of the eyelids, forming a series of white lines or follicles, and running in a serpentine direction; when viewed through a magnifier, they appear like rows of pearls. From their substance an oily or sebaceous matter may be squeezed out through the foramina or puncta ciliaria, placed upon the edges of the eyelids. The matter of these glands facilitates the motions of the eyelids, and prevents their accretion during sleep.

The lachrymal gland is situated upon the upper and outer

part of the eye, in a hollow behind the outer part of the superciliary ridge of the frontal bone. It is of the conglomerate kind, of a yellowish color, oblong form, and a little flattened, with one end pointing to the nose, the other to the outer angle of the eye. The excretory ducts of this gland (seven or eight in number), on account of their smallness, are not often seen; they terminate on the inner side of the upper eyelid, near the outer angle of the eye, and upper edge of the tarsus. The use of the lachrymal gland is to secrete the tears, which are spread over the surface of the eye by their own weight, and by the motion of the eyelids, for the purpose of preserving the delicacy of the eye, and particularly the transparency of the cornea.

The puncta lachrymalia are two small orifices situated at the inner canthus, one in the upper, the other in the under eyelid, at the extremity of the tarsus, and opposite to each other. Each punctum is seated obliquely upon a little eminence, and is surrounded with a cartilaginous circle, which keeps it constantly open. The puncta lachrymalia are the orifices of two small canals termed lachrymal ducts, or cornua limacum, which run in the direction of the edges of the eyelids towards the side of the nose, where they approach each other, and terminate together in the lachrymal sac. The tears which remain after moistening the eye are absorbed by the puncta, in the manner of capillary attraction, and are conveyed through their ducts into the lachrymal sac by the impulse of the eyelids.*

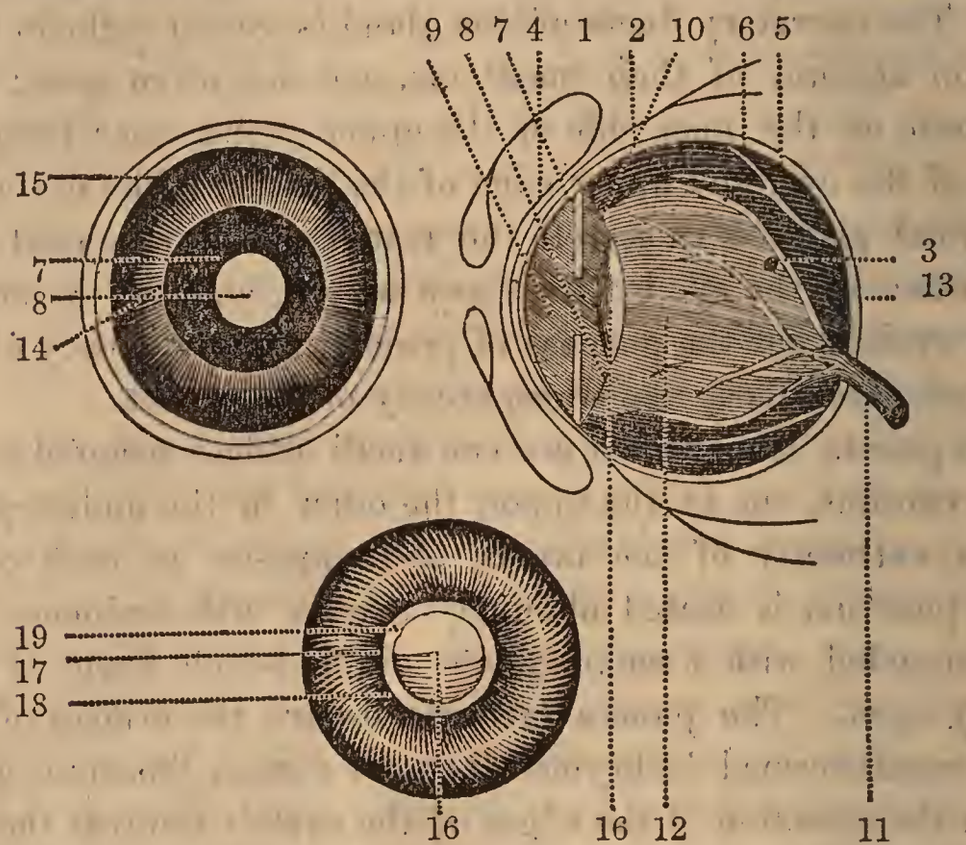
The caruncula lachrymalis is a small gland of a reddish color, of the conglomerate kind, supplying sebaceous matter to this part of the eyelids; and serving in particular to separate the puncta lachrymalia, and to direct the tears to them while the eyelids are shut. Minute hairs are found upon the surface of this body, serving to entangle small objects which get into the eye.

The lachrymal sac is a receptacle for the tears, and is placed in a fissure formed by the os unguis and superior maxillary

*From the diagram on the foregoing page, the student may learn how a probe should be inserted into the ductus ad nasum, *viz.*: by introducing it first in an horizontal, then in a perpendicular direction.

bone; the ductus ad nasum is a continuation of the sac, and conveys the superfluous tears into the nose.

The ball or globe of the eye is composed of common and true coats, which the accompanying diagram is intended to point out:



1. The tunica conjunctiva.
2. The tunica albuginea.
3. The tunica sclerotica.
4. The cornea.
5. The tunica choroides.
6. The ciliary nerves passing between the choroid and sclerotic coat.
7. The iris, which is connected to the choroid membrane by the ciliary ligament or circle.
8. The pupil.
9. The anterior chamber,
10. The posterior chamber, } containing the aqueous humor.
11. The optic nerve, seen perforating the sclerotic and choroid membranes, to be expanded into the retina, and the arteria centralis retinæ piercing the optic nerve.
12. The retina, with its artery ramifying upon its surface.
13. The foramen of Soemmering.
14. The ciliary ligament, seen connecting the iris to the choroid membrane.
15. The ciliary processes.
16. The crystalline lens surrounded by its capsule.
17. The vitreous humor surrounded by its capsule.
18. The zonula ciliaris.
19. The canalis Petitianus.

1. The tunica conjunctiva, or tunica adnata, named from its connecting the eye to the orbit, is a reflection of the skin con-

tinued from tarsus to tarsus, and canthus to canthus, over the whole fore part of the ball of the eye. It forms a small fold at the inferior tarsus, between it and the caruncula lachrymalis, termed valvula semilunaris. It is in form of a crescent, the horns of which are turned towards the puncta lachrymalia, to assist the caruncula in conducting the tears to the puncta. It is larger in the ape, and other quadrupeds, than in the human species, and still larger in birds; in which, as well as in quadrupeds, it is called membrana nictitans.

The tunica conjunctiva adheres slightly by means of cellular substance to the white of the eye, but so firmly to the cornea, as to be separated from it with difficulty. It is so remarkably thin, that the color of the subjacent parts appears readily through it; it supports the ball of the eye, prevents extraneous bodies from getting to the back part of it, and forms a smooth covering to lessen the friction between the eye and eyelids, and it is said to be a mucous membrane.

Between this coat and the white part of the eye, a quantity of loose cellular substance is found, which is very vascular, and is the common seat of ophthalmia. Under the tunica conjunctiva the recti muscles are said to send off a tendinous expansion, which passes over the cornea, termed the tunica albuginea; these constitute the common coats of the eye.

The tunica sclerotica, named from its hardness, is the largest and strongest coat of the eye, covering the whole ball, excepting the parts occupied by the entrance of the optic nerve behind, and by the cornea before. It is so firmly fixed to the edge of the cornea, that it has been considered as a continuation of the same substance; but it differs from the cornea, being of a pure white color, formed of fibres running in every direction, and closely interwoven with each other, and not divisible into layers. It is thickest posteriorly, and receives a little tinge on the inner surface, from the choroid coat, with which it is in contact.

The cornea, so called from its resemblance to horn, is termed by many authors cornea lucida, to distinguish it from the sclerotica, which these authors call cornea opaca. It forms the an-

terior pellucid covering of the eye, is more convex than the rest of the ball, and is joined to the tunica sclerotica, like the segment of a small sphere to that of a large one. The convexity, however, varies in different persons, so as to form a short or long sighted eye, according as the cornea is more or less prominent. In a recent subject, it is hard, dense, and transparent; but after maceration in water, it becomes soft and opaque, and may be readily separated, especially in young animals, into different lamellæ, the anterior of which is the continuation of the tunica adnata. By a slight degree of putrefaction, it may also be separated from the tunica sclerotica, and is found attached to it, as a watch-glass is to a watch. It collects the rays of light and transmits them to the eye, protects the tender parts within it, and contains the aqueous humor.

The tunica choroides lies under the sclerotica, and is connected to it by the trunks of vessels and nerves which pass from the one coat to the other, and also by a tender cellular substance, of a brown color, which tinges the inner surface of the sclerotica. It begins at the entrance of the optic nerve into the eye, runs between the sclerotica and retina nearly to the crystalline lens, where it is more firmly connected to the sclerotic coat than it is elsewhere, by means of the ciliary circle.

Many veins are observed on the choroid coat, running in various directions, making frequent anastomoses, termed venæ vorticosæ.

The ciliary nerves are also to be observed passing between the choroid and sclerotic coats; they are sent off from the lenticular ganglion, and run to be distributed upon the iris, ciliary ligament, and processes.

In the human eye, the choroid coat is of a dusky, brown color, both externally and internally; but the color varies considerably in the eyes of different animals.

Upon the inner side of the chroid coat there is a mucus, the color of which, in different animals, is found to correspond somewhat with the general color of the hair and skin; though, commonly, in the human body, it is of a blackish-brown, termed pigmentum nigrum; the darkness of the shade, however, still

corresponding with that of the hair. It is supposed to be produced from the vessels of this coat, and is blackest and thickest at the fore part of the eye, where it adheres so firmly as to be removed with difficulty; but behind it is thinner, more fluid, and more easily removed, becoming gradually less evident towards the optic nerve, round which it almost disappears. In advanced age, the pigmentum nigrum becomes more diluted and of a lighter color, so that the vessels of the choroid coat may be seen shining through the vitreous humor.

The choroid coat, with its dark paint, serves to intercept the rays of light which pass through the retina, thereby allowing a distinct image to be formed upon the bottom of the eye, and preventing the rays from being reflected, so as to form a second image. In those animals in which this coat, or its paint, is of a brighter color, it acts as a mirror to reflect light, and make the impression stronger.

The iris, so named from being in some persons of different colors, is the only coat of the eye which possesses motion. It was considered as a continuation of the choroid coat, until described by Zinn, who shows that it is only connected to this coat by the medium of the ciliary ligament. It is placed at a little distance from the cornea, begins a small way behind the junction of that coat with the sclerotica, and, running across, it forms a septum, a little convex anteriorly, and perforated in the middle by a hole, called the pupil, or sight of the eye. In the fœtus, the pupil is occupied by a vascular membrane, termed membrana pupillaris, which generally disappears between the seventh and ninth month of gestation. Upon the back part of the iris there is a dark-colored pigment, which has been considered as a posterior layer of the iris, called uvea, from its resemblance in color to the grape. When the paint is washed off, the iris exhibits two sets of fibres, concerning which various opinions have been entertained; one set in the form of radii, the different colors of which give the diversity of color to the eye; the other circular, surrounding the inner edge of the iris, and considered as the sphincter muscle of the pupil. The iris floats in the aqueous humor, and is of such a nature, that upon

exposure to a strong light, or when the eye looks upon a near object, the diameter of the pupil is diminished, and *vice versa*.

The different motions of the iris are supposed to be excited by the sensibility of the retina, and by the quantity of light which falls upon that nerve. The iris serves to regulate the quantity of light sent to the bottom of the eye.

The space between the cornea and the crystalline lens is divided into two cavities, called chambers; the anterior, situated between the cornea and iris, is the larger of the two; and the posterior, placed between the iris and crystalline lens, is so much smaller than the former, that its existence has been denied, though it is a distinct cavity, demonstrable in the adult where the pupil is open, and in the fœtus before the pupil is formed. The chambers contain the aqueous humor, clear as the purest water, but somewhat heavier, possessing a small degree of vascidity, and containing a little salt. In the fœtus, and for the first month after birth, it is reddish and turbid. When evacuated, it is quickly renewed; for within 48 hours after it has been discharged by puncture, the cornea is observed to be again perfectly distended. It is supposed to be secreted from the neighboring arteries, particularly from those on the fore part of the iris and ciliary processes. It serves to keep the cornea distended, and, by its roundish form and pellucidity, it collects and transmits the rays of light to the inner parts of the eye. It likewise guards th iris and lens, and admits of the motions of the former.

The Optic Nerve and Retina.— The optic nerve, in its passage through the orbit, is covered by a continuation of the membranes which surround the brain. At the foramen opticum, the dura mater is divided into two laminæ, one of which assists in forming the periosteum of the orbit; the other, which is again divided into two laminæ, furnishes a sheath to the nerve, and accompanies it to the tunica sclerotica, to which it is firmly connected by cellular substance. At the back part of the ball of the eye, and a little removed from the axis, towards the nose, the fasciculi of the optic nerve pass through a cribriform part of the sclerotic and choroid coats. The nerve is contracted at

its entrance through the sclerotic coat, but immediately after its ingress it expands to form the retina—so called from its supposed reticular appearance.

In the centre of the optic nerve, the artery of the retina is seen dividing into branches, which are dispersed upon its inner surface. The retina advances between the choroid coat and capsule of the vitreous humor, to the fore part of the eye, and terminates or disappears upon the anterior part of the edge, or greatest diameter of the capsule of the crystalline lens. The retina is contiguous to the choroid coat and capsule of the vitreous humor, but does not, by bloodvessels, or otherwise, adhere to either, till it reaches the ciliary ligament, under which the retina is so covered externally with the pigmentum nigrum, and adheres internally so closely to the capsule of the vitreous humor, as to be prevented from being seen till the black paint be washed off, or till all the coats be removed posteriorly, and the eye viewed through the medium of the vitreous humor. In the back part of the retina, directly in the axis of the eye, there is a central hole, of a dark color, surrounded with a yellow border, which becomes paler towards the circumference, the foramen of Soemmering. The retina is composed of a tender and pulpy-like substance, is semi-transparent, and of a light-gray color, resembling that of ground glass, and may be divided into two layers. The retina is the seat of vision, and therefore the primary part of the eye, to which all the other parts within the orbit are subservient.

The ciliary circle, or ciliary ligament, as it is called, is composed of a quantity of condensed, shining, cellular substance, which forms a white ring connecting the fore part of the choroides, and the root or outer margin of the iris, to the sclerotica. The choroid coat is much thinner and more tender than the sclerotic, and is one of the most vascular parts of the body, seeming, at first sight, to be entirely composed of vessels. The greater number of those on the outside run in whirls; while those on the inside taking a direction nearly parallel to each other are termed the membrana ruyschiana.

At the posterior part of the ciliary ligament there are num-

erous, pale, radiated, ciliary striæ, but so covered with the pigmentum nigrum as not to be distinctly seen till the paint is removed. These striæ become gradually broader and more elevated, and form white plicæ or folds, termed processus ciliaries, the intervals of which are also covered with the pigmentum nigrum.

The processus ciliares are commonly formed each of two or more striæ. They are not all of an equal size, and many of them are forked at their extremities.

The crystalline lens has its name from its resemblance to crystal, and from its lenticular form; though a solid body, which may be moulded into various shapes, it has always been classed among the humors of the eye. It is situated behind the aqueous humor, opposite to the pupil, and the whole of its posterior part is received into a depression on the fore part of the vitreous humor. Like a common lens, or magnifying glass, it has two convex surfaces, the anterior of which is less convex than the posterior, the two being formed of segments of spheres of unequal size. It has been observed that the figure of the lens varies at different periods, being in the fœtus almost of a spherical form, but becoming gradually flatter on the anterior and posterior surfaces, till about the age of 30, after which its form does not appear to vary. As the figure, so, also, the color and consistency are found to change at different times of life. In the fœtus, not only the capsule, but the lens also, is of a reddish color; but, immediately after birth, they become perfectly transparent. In a person considerably advanced in years, the lens is observed to acquire a yellow tinge, which appears first in the centre, and afterwards extends gradually to the circumference; and in extreme old age, this yellow tinge becomes so deep as to resemble amber. The lens becomes opaque soon after death, and acquires an additional opacity when put into spirits of wine. It is composed of concentric lamellæ, laid over each other like the coats of an onion. These lamellæ are connected by a fine cellular substance, and are more closely compacted the nearer they are to the centre. The substance of the lens somewhat resembles half-melted gum, is very soft and ten-

der on the outside, but becomes gradually firmer and tougher towards the centre, where it forms a nucleus.

The lens is surrounded by a very pellucid proper capsule, called tunica aranea, or crystalline, which is much thicker and more elastic than the capsule of the vitreous humor, but adheres so slightly, and is so easily lacerated, that after a small puncture has been made in it, the lens starts out, upon applying gentle pressure to the capsule. The posterior part of the capsule is much thinner, softer, and weaker than the anterior; but is quite a distinct membrane from the tunica vitrea; yet so firmly connected to it by cellular substance, that it is difficult to separate them without lacerating both the vitreous coat and its humor. Some describe an aqueous humor as seated between the lens and its capsule, the aqua Morgani.

The vitreous humor is situated in the back part of the cavity of the eye, from the insertion of the optic nerve to the surface of the crystalline lens. It is round at the back part and sides, where it is covered by the retina, but is concave before, where it forms a bed for the crystalline lens. It is by much the largest of the three humors, occupying upwards of nine-tenths of the whole eye, and has a gelatinous appearance, or is somewhat like the glaire of an egg. In an adult, it is always very transparent, and in an old person it does not, like the lens, degenerate into a yellow, or any other color. In the fœtus, like the aqueous humor, it is of a reddish color. The liquor with which the vitreous humor is filled is similar to the aqueous—very fluid, transpires readily through the capsule, though that coat be entire, and, like the aqueous humor, is somewhat thicker, heavier, and more viscid than water. When this humor is evacuated by puncture in the living body, it is seldom, though sometimes renewed. Upon the surface of this humor there is a coat, termed tunica vitrea, or hyaloidea, from its resemblance to glass, as transparent as the humor itself.

The tunica vitrea is remarkably smooth on its outer surface, but within, it sends processes into the body of the humor. The structure of the inner part of the coat consists of a set of delicate cells, which contain the liquor within them, as may be seen by the assistance of acids, or by boiling water. The cells of the tunic communicate freely with each other, as appears from the liquor oozing out by the smallest puncture made in the general capsule.

Under the ciliary ligament, the capsule of the vitreous humor

sends off an external lamina, which accompanies the retina, and is inserted with it into the fore part of the capsule of the lens, a little before its anterior edge. It is termed zonula ciliaris, from its striated appearance and circular form, and assists in fixing the lens to the vitreous humor. After sending off the ciliary zone, the coat of the vitreous humor goes behind the capsule of the lens, with which it is intimately connected.

Between the ciliary zone and the part where the capsule of the vitreous humor adheres to that of the lens, a passage is formed named canalis Petitianus, after Petit, who discovered it. The membranes forming this passage are pervaded by transverse fibres in such a manner, that when air is introduced, it goes freely round the edge of the lens; but the passage has a cellular appearance, being contracted and dilated alternately. The canal of Petit is nearly of the same breadth with the ciliary ligament; it is always empty, and has no communication with the capsules of the vitreous or crystalline humors. The vitreous humor serves to give shape to the eye, to keep the coats properly expanded, to preserve the due distance of the lens, and direct the rays of light to the retina.

The eye receives and collects the rays of light, in such a manner as to form upon the retina the image or picture of the object which the eye looks at; and the point where these different rays meet is called the focus. The object is painted upon the retina in an inverted manner, the rays from above falling upon its under, and those from below upon its upper, part; it is supposed to be by habit, or rather by instinct, that we judge of the real situation of the object. That the rays of light may terminate distinctly on the retina, it is necessary that both the cornea and crystalline lens should have a certain degree of convexity. If either the one or the other be too prominent, the focus will be formed before it reaches the retina, as is the case in short-sighted people, who require concave glasses to enable them to see objects distinctly, at the proper and ordinary distance. If, on the contrary, the cornea or lens be too flat, or the refractive power of the humors be in any way diminished, the focus will then be imperfectly formed, till the object is viewed at a greater distance than ordinary, as is the case with persons advanced in life, to whom the assistance of convex glasses becomes necessary. The eye is enabled to judge and accommodate itself to objects at different distances, by the action of its muscles increasing or diminishing the length of its axis, and by the motions of the iris allowing a greater or smaller quantity of light to be thrown into the eye.

TESTIMONIALS.

DR. PHILLIPS thinks the following testimonials will be an introduction to those to whom he is at present unknown:—

"As far as my acquaintance with Mr. John Phillips extends, I regard him as a worthy gentleman, and very competent in his profession.

A. LINCOLN,
President of the United States."

"As far as my acquaintance with Mr. John Phillips extends, I regard him as a worthy gentleman, and very competent in his profession.

JOHN MOORE,
Nov. 20, 1854. *Treasurer of Illinois.*"

"DR. PHILLIPS: *Dear Sir*:—When I come to Springfield, as you are aware, I could neither read nor write, and had not for months. I owe it to your kindness and skill that my eyes were almost entirely relieved in a single week, and are now quite well. This I the more gratefully acknowledge as it was all effected without any pain and with little trouble to myself.

J. B. TURNER, *Jacksonville, Ill.*"

"SIR:—I beg to state, with gratitude, that having been afflicted with Oposity in one of my eyes, which has, for two years, rendered me nearly blind, but by attending to your medicines, and by the use of your vapors, I am so far restored as to be able to see to pick up a small pin at considerable distance from me, and to read with perfect ease, without which assistance from you, I am sure I should have become entirely blind. Accept my grateful thanks.

Your obedient servant,
JEFFERSON MOORE."

Bloomington, Dec. 9th, 1854.

"I have formed an acquaintance with Mr. John Phillips, as an Optician and Oculist, he is well informed in the structure and functions of the eye, and its diseases and defects, and understands the adaption of glasses to the eye with much skill. I am using glasses selected by him, and find them very pleasant, and do not strain or fatigue the eye, a great desideratum. I cheerfully recommend him to those requiring glasses.

JOHN TODD, M.D."

Springfield, Dec. 19, 1851.

"I have taken some pains to ascertain Doctor Phillips' claims for patronage as an optician, and can unhesitatingly recommend him to those needing spectacles, or who are about to need them. I have also witnessed his treatment of chronic inflammation of the eyes, and can assure the public that while his treatment is safe, it is more than usually successful.

DAVID PRINCE, M.D., *Jacksonville, Ill.*"

"We can take pleasure in recommending Doctor John Phillips as a superior Optician and safe practical Oculist.

LORD & FOWLER, Surgeons."

Springfield, Jan. 14, 1856.

"SIR:—I beg to acknowledge the great benefit derived by your application to my eyes, and thank you for the attention shown to me, and also highly recommend you to the public.

Yours respectfully,

G. METSKER, *Petersburg, Ill.*"

"I have taken some pains to acquaint myself with Mr. John Phillips, and find a thoroughly scientific Optician, as well as a skilful Oculist. It affords me much pleasure to recommend him with full confidence to the patronage of those needing his services. SANFORD BELL, M.D."

Springfield, Dec. 18, 1854.

DR. PHILLIPS has also many testimonials from gentlemen of high standing in the Medical Profession in both this country and Europe, among whom are:

Ex-Governor Yates, Springfield, Ill.
Judge Logan, " "
Lawyer Edwards, " "
Governor Mattison, Springfield, Ill.
Hon. N. B. Judd, United States Senator, Washingon, D.C.
William Gwynn, Tiffin, Ohio.
Judge Davis, Bloomington, Ill.
" Bradwell, of the County Court, Chicago, Ill.
" McAllister, of the Recorder's Court, Chicago, Ill.
Daniel O'Hara, Esq., Clerk Recorder's Court, Chicago, Ill.
General Soloman, Chicago, Ill.
Dr. J. B. Walker, McVicker's Theatre Building, Chicago.
Dr. H. Ralls Smith, Chicago, Ill.
Dr. J. S. Underwood, " "
Wm. Lill, Esq., Brewer, " "
Peter Macfarlane, Esq., " "
M. O. Walker, Esq., " "
George W. Gage, Esq., " "
Judge Henry Fuller. " "

INDEX.

TEST TYPES.

BY DR. JOHN PHILLIPS.

No. 1—Diamond.

Though, in the choice of spectacles, every one must finally determine for himself which are the glasses through which he obtains the most distinct vision; yet, some confidence should be placed in the judgment of the artist of whom they are purchased, and some attention paid to his directions. By trying many spectacles, the eye is fatigued, as the pupil varies in size with every different glass; and the eye endeavors to accommodate itself to every change that is produced. Hence, the purchaser often fixes upon a pair of spectacles, not the best adapted to his sight, but those which seem to relieve him most, while his eyes are in a forced and unnatural state; and, consequently, when he gets home, and they are returned to their natural state, he finds what he had chosen fatiguing and injurious to his sight.

No. 2—Pearl.

Increasing years have a natural tendency to bring on the defect, and earlier among those who have made the least use of their eyes in their youth; but, whatever care be taken of the sight, the decays of nature cannot be prevented: the humors of the eye will gradually waste and decay; the refractive coats will become flatter; and the other parts of the eye more rigid, and less pliable: thus, the latitude of distinct vision will become contracted: it is also highly probable that the retina and optic nerve lose a portion of their sensibility.

Though it is in the general course of nature that this defect should augment with age, yet there are not wanting instances of those who have recovered their sight at an advanced period; and have been able to lay aside their glasses, and read and write with pleasure, without any artificial assistance.

Among many causes which may produce this effect, the most probable is, that it generally rises from a decay of the fat in the bottom of the orbit; the pressure in this part ceasing, the eye expands into somewhat of an oval form; and the retina is removed to a due focal distance from the crystalline.

No. 3—Nonpareil.

There is one point of considerable importance which is often disregarded, *viz.*: the fitting of the spectacle frame, so that the centre of each glass shall be exactly opposite to the pupil of the corresponding eye. A moment's reflection will show how important this is. There are scarcely two persons of precisely the same width between the eyes, and yet, in the majority of cases, this fact is entirely lost sight of in the selection of spectacles. A person finds, that when at an optician's, he looks through a lens of a certain power, it suits him exactly; he sees delightfully with it, and forthwith orders spectacles of that power.

He tries them on as soon as he receives them, anticipating with eagerness the comfort they will afford him; instead of which, he finds that he can hardly see at all, or, if he does, his eyes soon feel fatigued. The glasses are right; the error is in the frame.

No. 4—Minion.

We are now able to decide upon a very important question, and say how far spectacles may be said to be *preservers of the sight.* It is plain they can only be recommended, as such, to those whose eyes are beginning to fail; and it would be as absurd to advise the use of spectacles to those who feel none of the foregoing inconveniences, as it would be for a man in health to use crutches, to save his legs. But those who feel those inconveniences, should immediately take to spectacles; which by enabling them to see objects nearer, and by facilitating the union of the rays of light on the retina, will support and preserve the sight.

No. 5—Long Primer.

Many are the advantages that are derived from our having two eyes—some that are known, others that are unknown; for the correspondence of the double parts of the human frame, and their relation to the two great faculties of the human mind, has not been sufficiently attended to by anatomists. By having two eyes, the sight is rendered stronger, and the vision more perfect; for, as each eye looks upon the same object, a more forcible impression is made, and a livelier conception formed by the mind.

No. 6—Small Pica.

Some refrain from the use of glasses who really require their aid, from the belief that if they once begin to use them, they will never be able to leave them off. In the great majority of cases this is perfectly true; but, even then, it is better to submit with a good grace to an affliction which can seldom be averted, and to have recourse to those simple means which at once set the eye at ease, and enable its possessor to enjoy many hours of comfort and rational employment, which would otherwise be lost.

No. 7—Pica.

The color and consistence of this humor alter with age; it becomes thicker, cloudy, and less transparent, as we advance in years; which is one reason, among others, why many elderly people do not reap all that benefit from spectacles which they might naturally expect.

No. 8—English.

Consequently, as artificial light possesses more red and yellow rays than daylight, it is more fatiguing and injurious to the eyes.

No. 11.

By a medium, in the language of opticians, is meant any transparent substance, solid or fluid, through which light passes.

No. 12.

It is a well-known fact, that when flame is not raised to a very high temperature, it gives out red light.

No. 13.

Whatever is seen or beheld by the eye, is by opticians called an object.

No. 14.

One medium is said to be more

No. 15.

Dense than another when

No. 16.

Contains more in same bulk

No. 17.

And Size than ones

WESTERN NEWS COMPANY.; WM. B. KEEN & COOKE, AND
DR. PHILLIPS, 168 CLARK STREET, CHICAGO.

OPHTHALMIC SURGERY AND TREATMENT:

WITH

ADVICE ON THE USE AND ABUSE OF SPECTACLES.

By JOHN PHILLIPS, Optician and Oculist.

Cloth $5.00. ***Just Published.*** *Sheep $5.50.*

INDEX.

OPINIONS OF THE PRESS:

From the Chicago Medical Journal.

The first portion of the book is a complete thesis on "the use and abuse of spectacles," and is eminently practical in its character, and, we think, well calculated to impart knowledge on a very important and much-neglected subject. It will bear careful perusal. The various inflammatory diseases of the eye naturally claim a large space. As a whole, this work is well written, and especially is this the case in the chapters on scrofulous ophthalmia, and conjunctivitis and its sequel, "granulated eyelid," the most frequent and by far the most obstinate "of the curable diseases to which the eye is subject." The various formula in this part of the work will be found valuable.

The chapter on diseases of the lachrymal apparatus (25 pages) is well written, and exhausts the subject. Due credit is given to Mr. Bowman for the introduction of his simple and successful operation of slitting up the puncta and canaliculi, and adopting a series of large probes in the treatment of obstructions and strictures of these passages.

The division of the work on ophthalmic surgery is, of course, about the same as in other recent works on the same subject; but as no branch of surgery is more progressive than this, and improvements, both in instruments and the *modus operandi*, are constantly being made, it is something to say that this work is, in some respects, more comprehensive, and in advance of its predecessors.

The new work of Dr. Bader, just published in London, contributes a fair quota of valuable and reliable matter.

We notice that Dr. Turnbull's practice (introduced in 1837, and since fallen into disuse) of treating various maladies of the eye by exposing the organ to medicated vapors is here strongly advocated; and we remember that Dr. Williams, of Boston, in his recent work, takes similar ground, especially in the treatment of asthenopia.

From the Chicago Medical Times.

This work comprises a full consideration of the optical, medical, and surgical treatment of affections of the eye, and is well worthy a careful perusal. The first 68 pages contains much practical and valuable advice on "the use and abuse of spectacles," and supplies a want that has been long felt in the profession. That portion of the work devoted to the consideration of the various inflammatory diseases of the eye, is replete with valuable information gleaned from practice and from all the best authorities of the present day. The most recent and improved methods of treatment are given in full; and no single disease of the eye has been overlooked by the author.

The surgical department describes the various operations on the eye in a very careful and accurate manner, but does not differ from that already laid down by other authors on the subject.

As this work just came to hand before going to press, we cannot give it that careful review we would wish, but will examine it carefully, and give a fuller notice hereafter.

From the Chicago Evening Post.

Dr. John Phillips, a Chicago optician and oculist of many years' practice, has just published, through the Western News Company and W. B. Keen & Cooke, a very exhaustive treatise on Ophthalmic Surgery and Treatment. Without the technical knowledge necessary to a criticism of this book, we can only mention Dr. Phillips professional experience, and say that his book, a substantial octavo of over 500 pages, is the most elaborate work on this branch of surgery ever published in this country, or perhaps any other.

From the Chicago Tribune.

The preparation of this book on one of the most important subjects of medical knowledge and practice, has been undertaken with great pains by a practical optician and oculist of thirty years' experience, to meet the requirements of men in general practice, by the presentation in brief of the results of study and experience in this special department. It will be examined, therefore, by the profession with the interest that so important and useful an aim deserves to

awaken, and the service which it can render gratefully accepted. Though scientific and learned, for the most part, portions of the work may be profitably consulted by the general reader, especially the first 50 pages, which contain practical advice in regard to the eyes.

From the Chicago Times.

Dr. Phillips extensive experience as a practical optician renders him well qualified to treat of this subject in the department which he has chosen—a description of the outward phenomena, which forms his main topic. To describe accurately and simply the appearance of the various tissues of the eye in health and disease, and to render this science intelligible and useful, is the avowed object of the author.

The book is made valuable by the range and reliability of the treatises and works on the eye which have been consulted, and which are quoted in their proper applications. These include the best authorities, trace the latest developments of the science, and, together with the copious cuts, present much that may be made useful to the profession.

From the Chicago Evening Journal.

We have just received from the author, Dr. John Phillips, optician and oculist, a work on "Ophthalmic Surgery and Treatment, with Advice on the Use and Abuse of Spectacles." This is an octavo volume of 500 pages, and is the most exhaustive treatise on ophthalmic pathology extant. Dr. Phillips has lived in Chicago and made a speciality of optical affections for 30 years; and we know that he is thoroughly acquainted with the subject upon which he treats. His success in treating ophthalmic diseases has been truly wonderful. Not a few of the speciality doctors in the country are quacks, and for that reason we put special stress upon the reliability of Dr. Phillips. We can form no independent judgment of the work before us, but we commend it with all confidence on the long-established reputation of the author. Every physician should have a copy. It supplies a want which, we are told, has long been felt in pathological literature. The interest and value of the book is not, however, confined to the medical profession. There are thousands who suffer more or less from weak or diseased eyes who would find in it much of practical use to them. Indeed, those perfectly sound in these respects would find herein instruction that might keep them from abusing the most delicate and precious of all our organs. The "window of the soul" is often darkened before its time through ignorance. If this great work is duly appreciated, and the knowledge derivable from it put in practice, it will do immense good. Published by the Western News Company and W. B. Keen & Cooke, Chicago.

From the Prairie Farmer.

This book is full of curious and valuable information. It treats of every possible infirmity of vision, and sets forth the means for their cure. All the operations upon the eye are illustrated by cuts, some of which are quite new even to the student of ophthmic surgery. The remarks upon near and far-sightedness, and the advice given upon the selection of proper glasses therefor, will be useful to a large class of readers.

The style of the work is excellent, the phraseology clear and pointed. There is no parade of cabalistic words, and no meretricious flourish of science in the volume. It is an honest, straight-forward publication, that will do its own work, and do it well. We commend it to the more intelligent of our readers as not at all likely to incite them to put out their own eyes, and to our medical friends as one of the best means of teaching them how to take care of these important organs for other people.

From the Chicago Republican.

Mr. Phillips is well and widely known, and brings to this work the result of thirty years' practice as an optician and oculist. His book bears evidence of careful and extended research in the investigations of diseases of the eye, and must be a valuable aid to all who have to deal with the specialities of which it treats.

Robert Fergus' Sons, Printers, 12 and 14 Clark St., Chicago.

EYE AND EAR INFIRMARY,

No. 82 Madison St., Chicago, Ill.

Dr. J. B. WALKER, Operating and Consulting Surgeon.

Dr. Walker attends exclusively to this important Specialty, and performs every operation connected with **Ophthalmic and Aural Surgery**, such as for Cataract, Artificial Pupil, Cross Eye, Tarsal Tumors, Closure of the Tear Duct, Polypus, Excision of the Tonsils, &c. Catarrh, and certain diseases of the throat which frequently cause Deafness and Noises in the Head, will also receive special attention.

TESTIMONIALS, &c., Selected from many others of a similar nature.

Critical Surgical Operation.—Our attention has been called to a very remarkable instance of restoration to sight after entire loss of vision for ten years. The facts of the case are as follows: Mr. Robert Welliver, of Andrew, Jackson County, Iowa, met with a severe accident, about ten years ago, which resulted in blindness, one eye having been put out, and the other being seriously mutilated, so that after a time his friends sent the young man to the Iowa State Institution for the Blind, where he remained five years.

About two months since, hearing of the restoration of a friend who had been also blind, he came to this city, and, although not a very promising case, (the colored part of the eye having been severed by the accident,) a surgical operation was decided upon and performed by Dr. J. B. Walker, for the removal of an opaque lens and the formation of an artificial pupil. This was successfully done at one sitting, and the result is that the patient can now see to read, and is no longer dependent on his friends. The Doctor has also inserted an artificial eye on the other side, and the appearance of the face is now natural and pleasing.

Mr. Welliver is now staying at 257½ West Randolph street, and will be happy to answer inquiries respecting his interesting case.

No branch of medical science is more progressive than ophthalmic surgery, and Dr. Walker is known and recognized as one of the most diligent students and successful practitioners of this important branch of the healing art. The case we mention must be very gratifying to all parties concerned.—*Chicago Tribune.*

An Hour with Dr. Walker.—A few days since, we had occasion to call at the rooms of Dr. J. B. Walker, Oculist and Aurist, of Chicago, and were really surprised to find so many deaf and blind there assembled. Among others were several from this vicinity, and all were progressing rapidly towards recovery.

Mr. Lewis Wheeler, of Earlville, had submitted to a surgical operation about three weeks previously, and, after suffering from indistinct vision for four years, and complete blindness one year, was instantly restored to sight.

Mrs. James Fagan, of Lamoille, Bureau County, had been successfully operated on for cataract of both eyes, and was on the point of leaving for home, cured.

Mr. L. R. Leavitt, school teacher, of Lake Mills, Wis., while attending the National Teachers' Convention, had been operated on for deafness and noises in the head, and perfectly restored at one sitting, as was also Mrs. Elizabeth Dickinson, of Mineral Point, Wis., for closure of the tear duct.

We also saw a young lady from our own district, who had been blind from amaurosis, a formidable disease of the optic nerve, who was sent to Dr. Walker by one of our leading physicians, with but little hopes of her restoration to sight, and she also was cured, and is now at home.

These, and other instances of marked success, are of much importance, and, as such diseases prevail to a serious extent, we feel that we are doing our readers a good service in deviating from our usual course, and making a note of the above.—*Ottawa Free Trader.*

A Surgical Operation on a child born blind has been successfully performed by Dr. J. B. Walker, assisted by Dr. E. C. Rogers, Surgeon of the U. S. Marine Hospital, Chicago. Captain Harry Miller, of Grand Haven, Mich., the father of the child, reports that the little fellow can now see, and is making wonderful discoveries every day.—*Chicago Tribune.*

Dr. Walker.—We call the attention of our readers to the following from a well-known citizen:

I certify that my mother, Mrs. Livingston Jenks, residing at Tonica, this State, aged 69 years, was blind from what is termed capsulo-lenticular cataract, for about two years and being anxious to obtain the best surgical aid in a matter of such importance, (as I knew many practiced specialties without any special knowledge or skill,) I made careful inquiry of leading members of the medical profession in Chicago, and was by them referred to Dr. J. B. Walker, of this city. I therefore determined to employ him, and am happy to say that, by a skillful surgical operation on each eye, my mother's vision has been restored, and the result is a perfect success. And in consequence of this, to which unexpected and gratifying result, I feel ir[illegible] make this [illegible]ent, [illegible] unsolicited by Dr. Walker.

CHANCELLOR JENKS,
[illegible], of Lee, 77 Clark St., Chicago.

Cases of sore eyes have been frequent, but they have yielded in every case to the treatment prescribed by Dr. Walker, Oculist, of this city. Especially should the case of Norris Lapiere be noticed, who recovered very rapidly from an operation performed on one eye, that the other might be saved.—*From Annual Report Chicago Home of the Friendless, for year ending Dec., 1864.*

Patients provided with Board, Lodging, and Attendance.

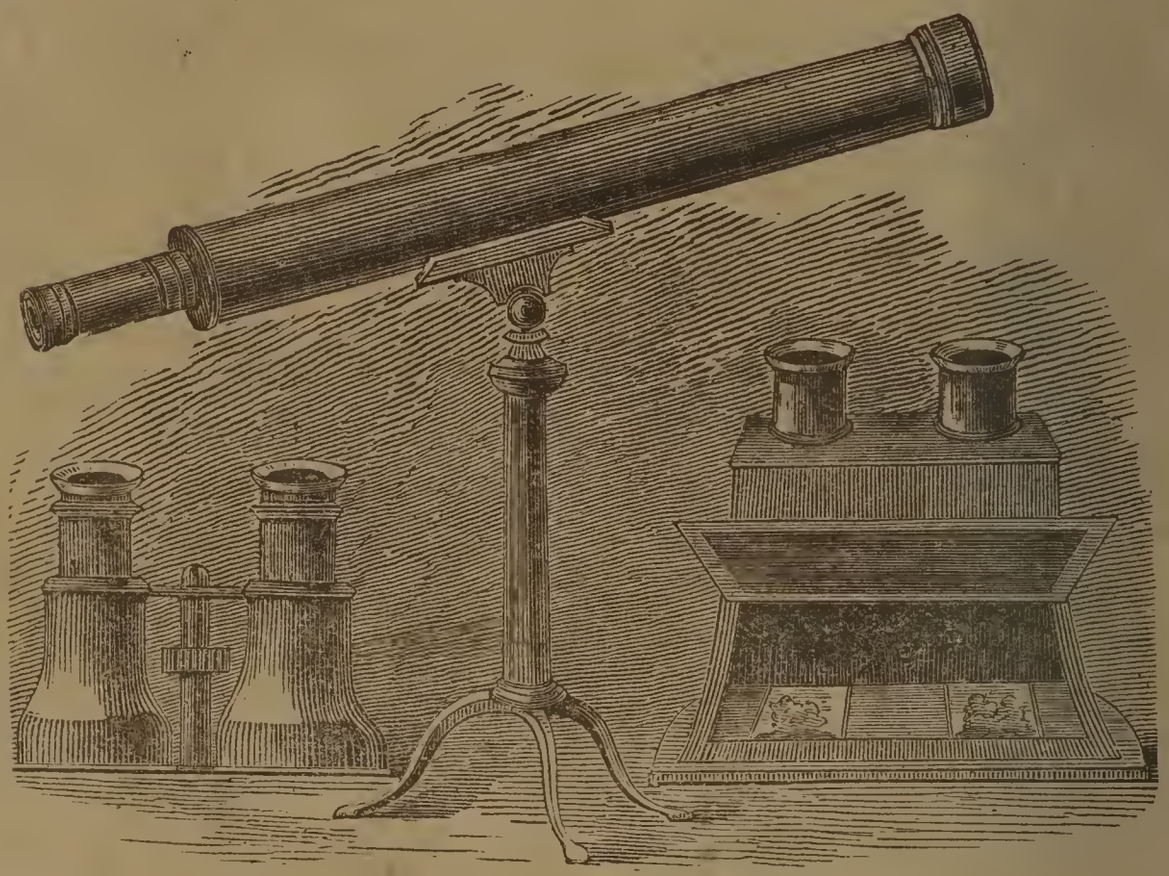
FRENCH ARTIFICIAL EYES, of the best quality, and all modern appliances for the relief of the Deaf and Blind. Address

Dr. J. B. WALKER,
82 Madison St., Chicago.

DR. JOHN PHILLIPS,

PRACTICAL

OPTICIAN AND OCULIST,



TELESCOPES,

STEREOSCOPES, OPERA GLASSES, &c.

French Artificial Eyes Inserted,

No. 168 CLARK STREET,

CHICAGO, ILL.

Spectacles Suited by Inspection of the Eye.